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A Sustainability-Oriented Institutional Practices and their Impact on Student Engagement and Educational Quality: Empirical Evidence from Engineering and Management Institutions in India

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Abstract: ***Sustainability is becoming a key issue in the reforms of higher education across the globe, and there has been growing interest in ensuring that the environmental, social, and economic aspects are incorporated in the practices of education and institutions. The National Education Policy (NEP) 2020 in India is based on the principles of multidisciplinary, holistic, and high-quality education, with sustainability as a key principle. The empirical study is based on the impact of sustainability-focused practices in line with NEP 2020 on student engagement and the quality of education in engineering and management institutions located in the North Maharashtra region. The quantitative research design was used, and 528 respondents were sampled by a structured questionnaire. The instrument showed good internal consistency (Cronbach's alpha = .992). The initial exploratory factor analysis found five main dimensions of sustainable practices, which were then followed by correlation and multiple regression analysis. The results indicate that both curriculum-level sustainability integration and effective campus sustainability communication are important factors that improve student engagement and the quality of education, which together account for 63.8 percent of the total variability in student engagement. The research presents the empirical data that has proven NEP 2020 implementation and presents the practical information to be utilized by institutions of higher education in order to enhance the educational outcomes using the sustainability-oriented approach.***

Keywords: Sustainability in Higher Education, NEP 2020, Student Engagement, Educational Quality, Engineering and Management Education

1. Introduction

Universities and colleges are now being seen as important players in solving global issues like climate change, social inequalities, depletion of resources, and sustainable growth. Universities as producers of knowledge and skill formers have a central role in the creation of future professionals who can address these complex and interconnected problems. In these regards, sustainability has become a major dimension of quality education that is not limited to environmental consciousness but covers social responsibility, moral logic, and economic sustainability [1].

The education in engineering and management is particularly important in the context of the sustainability discourse. The products of these fields are supposed to create technologies, run organizations and make policies that have a direct impact on outputs of sustainable development. Therefore, institutes of higher learning that provide engineering and management courses are increasingly being pressured to incorporate sustainability concepts in their curricula, methodologies, as well as operations [2]. Integration of this kind can no longer be regarded as an added-value feature, but a necessity, which must be considered as a staple of educational relevance and graduate employability in the fast-changing global environment [2,3,12].

The National Education Policy (NEP) 2020 is an exceptional reform agenda in India to restructure the higher education system and address current and relevant societal and economic demands [4]. The policy is based on the holistic and multidisciplinary education, experiential learning, institutional autonomy, and outcome-based assessment. Sustainability is also introduced as a cross-cutting principle in NEP 2020, which calls upon institutions to factor in academic programs, teaching and learning processes, and campus practices in the wider context of sustainable development [5]. NEP 2020 aims to encourage learner-centered education that would encourage critical thinking, creativity and social responsibility through curriculum reform and innovative pedagogical models [6].

Although the NEP 2020 has a detailed vision, the challenges of moving the policy intent to an effective institutional practice are still a major issue. Although most institutions may claim to be in line with the sustainability objectives and policy guidelines, the practice of being sustainability oriented is not uniform in all regions and institutions. Such an imbalance creates significant concerns about the efficiency of sustainability programs in stimulating student involvement and advancing the quality of education. Aligned policies do not lead to significant results unless they are reinforced by such specific steps as curriculum integration, faculty participation, and the engagement of students.

The articles on sustainability in higher education have so far concentrated on theoretical based models as well as the curriculum, and normative debate on sustainable development education. Whereas these researches prove the significance of

sustainability integration, there is a comparatively few studies with an empirical investigation of the direct effect of the concept on student engagement and the quality of education, especially in the Indian higher education setting [6].

Moreover, the studies examining the institutional practices in relation to NEP 2020 in particular, are few leaving the gap between the policy discourse and the evidence-based assessment [7].

The student engagement is an important metric of institutional effectiveness and quality of education. Motivated students show increased learning, involvement in academic and co-curricular activities [8]. Well executed sustainability initiatives can help to improve the level of engagement among the students by offering practical applicability and hands-on learning experiences and the chance to assist the community socially. Nevertheless, the degree to which such initiatives determine engagement and perceived educational quality is a systematic issue that needs to be empirically scrutinized [5].

The North Maharashtra area provides a distinct empirical context to this study because it has different engineering and management colleges with different degrees of infrastructure, expertise of the faculties, and sustainability programs. Such regional diversity allows evaluating the ways of implementing sustainability practices in institutional settings and the impact of sustainability practices on student engagement and learning outcomes.

It is in this context that an attempt is made to determine the effects of sustainable practices that are in line with NEP 2020 on student engagement and the quality of education in engineering and management institutions within North Maharashtra in the present study [9]. Through a quantitative research design and a stringent statistical analysis, the research aims at delivering empirical data on how effective sustainability-based institutional practices can be. The results will also be relevant to the current body of knowledge on sustainability in higher education, institutional decision-making, and effective implementation of NEP 2020 within the Indian higher education system [10].

2. Methodology

2.1 Title and authors

In this research, the quantitative and cross-sectional research design was used to investigate the effects of sustainability-based institutional practices as per the National Education Policy (NEP) 2020 on student engagement and education quality in engineering and management institutions. The survey-based methodology was used because it allows gathering data with a big number of respondents who are systematically collected and helps using multivariate statistics to analyze the relationship between variables [11].

2.2 Population and Sample

Students who were in engineering and management institutions within the North Maharashtra region of India constituted the target population. The questionnaire was given to the students of various institutions in a structured form to make sure that the different academic settings are represented. Out of 550 administered questionnaires, 528 were determined to be complete and valid following data screening [12,13]. The sample size was considered sufficient to conduct the factor analysis, correlation analysis, and multiple regression analysis based on the accepted statistics of conducting quantitative research.

2.3 Instrument Development

A structured questionnaire comprising of 91 items was used to collect data; the items were designed to reflect the variables of sustainability-oriented institutional practices, student engagement, institutional support mechanisms and perceived quality of education in respect to NEP 2020. The measurement was done based on the five-point Likert scale (1 (strongly disagree) to 5 (strongly agree)) [12-14]. The tool was structured in such a way that it was meant to measure several aspects of the sustainability integration such as design of the curriculum, faculty engagement, communication within the campus and alignment of the institution policy.

2.4 Reliability and Validity

Cronbach alpha coefficient was used to test the internal consistency of the research instrument. The findings showed a high level of reliability and the overall alpha value of 0.992 was excellent, and it indicates high levels of internal consistency among the items [13].

In order to determine construct validity, Principal Component Analysis with Varimax rotation was used to perform Exploratory Factor Analysis (EFA). The factor analysis led to the derivation of five factors which are shown as important dimensions of sustainability-oriented practices. The combination of these factors created a total of 71.91 percent of the total variance that represents a great level of construct validity, and it proves that the instrument is appropriate to be further statistically analyzed [14].

2.5 Data Analysis Procedures

The data collected were studied using the Statistical Package of Social Sciences (SPSS). Descriptive statistical and inferential procedures were used to tackle the research objectives. The characteristics of respondents and variable distributions were summarized using descriptive statistics. Pearson correlation was used to test the nature and direction of the relationships between sustainability practices, student engagement, and policy alignment [13-14]].

In order to evaluate the predictive power of sustainability-based practices on the student engagement and quality of the education process, multiple linear regression analysis was carried out. The level of statistical significance was considered at the 5% level of significance ($p < 0.05$), which was considered robust and reliable [12].

3. Results

This section gives the empirical results of the study, which were obtained through correlation and regression studies and aimed at testing the relationships among sustainability-

oriented institutional practices, student engagement, and quality of education in engineering and management institutions.

3.1 Correlation Analysis

The Pearson correlation analysis was conducted in order to determine the strength and direction of the relationships between the key constructs, such as, sustainable curriculum, faculty sustainability evaluation, faculty mentorship in sustainability, campus sustainability communication, student engagement in advocacy, and institutional alignment with NEP 2020.

The findings show that, there are strong and positive and statistically significant correlations between all the variables ($p < 0.01$), which suggests a high level of interrelatedness between sustainability practices and student-centered outcomes. Sustainable curriculum showed a very positive relationship with faculty sustainability evaluation ($r = 0.766$) and NEP policy alignment ($r = 0.734$), which means that sustainability integration in the curriculum is significantly associated with policy-level programs in the institution.

Sustainability communication on campus was found to have one of the highest correlations with student engagement in advocacy ($r = 0.744$), underscoring the need to display and participate in sustainability programs on the campus in promoting student engagement. On the same note, faculty mentorship in sustainability was having a moderate-strong positive correlation with student engagement ($r = 0.614$), indicating that faculty support is supportive but secondary in ensuring engagement.

Altogether, the outcomes of the correlation reveal initial evidence of the positive relationship between sustainability-oriented institutional practices with student engagement and the alignment of the institutional policy.

Table 1: Pearson Correlation Matrix (N = 528)

Variables	*SC*	*FSE*	*FMS*	*CSC*	*SEA*	*NEP*
Sustainable Curriculum (SC)	1	.766**	.629**	.573**	.665**	.734**
Faculty Sustainability Evaluation (FSE)	.766**	1	.727**	.568**	.566**	.769**
Faculty Mentorship in Sustainability (FMS)	.629**	.727**	1	.574**	.614**	.687**
Campus Sustainability Communication (CSC)	.573**	.568**	.574**	1	.744**	.615**
Student Engagement in Advocacy (SEA)	.665**	.566**	.614**	.744**	1	.586**
NEP Policy Alignment (NEP)	.734**	.769**	.687**	.615**	.586**	1

3.2 Regression Model: Student Engagement Predictors

A multiple linear regression analysis was carried out to investigate the level at which sustainability-oriented practices forecast student engagement where student engagement in advocacy was the dependent variable.

3.2.1 Model Fit

The regression model showed a great fit with multiple correlation coefficient (R) of 0.799. The predictor variables explained 63.8 percent of the variance in student engagement as represented by the coefficient of determination (R2). The adjusted R 2 value (0.636) also proved the strength of the model based on the complexity of the model and the sample size.

Table 2: Regression Model Summary

R	*R²*	*Adjusted R²*	*Std. Error*
0.799	0.638	0.636	0.561

3.2.2 Model Significance

The results of the analysis of variance (ANOVA) proved that the regression model was statistically significant ($F = 230.864$, $p < 0.01$). This implies that the combination of the predictors pertaining to sustainability includes an interesting explanation of the difference in student engagement.

Table 3: ANOVA

Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	291.079	4	72.770	230.864	.000
Residual	164.853	523	0.315		
Total	455.932	527			

3.2.3 Regression Coefficients

The standardized regression coefficients revealed differential effects of sustainability-oriented practices on student engagement. Campus sustainability communication emerged as the strongest predictor ($\beta = 0.548$, $p < 0.001$), indicating that institutional efforts to communicate sustainability initiatives significantly enhance student involvement.

Sustainable curriculum integration also exerted a significant positive influence on student engagement ($\beta = 0.377$, $p < 0.001$), underscoring the role of curriculum design in shaping student attitudes and participation. In contrast, faculty sustainability evaluation ($\beta = –0.030$, $p > 0.05$) and NEP policy alignment ($\beta = –0.005$, $p > 0.05$) did not demonstrate statistically significant direct effects on student engagement. These findings suggest that student engagement is more strongly influenced by visible and experiential sustainability practices than by formal evaluation mechanisms or policy alignment alone.

Table 4: Regression Coefficients

Predictor	*Standardized β*	*t-value*	*Sig.*
Sustainable Curriculum	0.377	8.506	.000
Campus Sustainability Communication	0.548	15.928	.000
Faculty Sustainability Evaluation	-0.030	-0.634	.526
NEP Policy Alignment	-0.005	-0.115	.908

3.3 Regression Analysis: Quality of Education Impact.

An independent regression was done to determine the effect of sustainability-oriented practice on perceived quality of education. The findings showed that the model was significant

($p < 0.05$) and thus null hypothesis was rejected. The results affirm that the institutional practices that are sustainability-focused have a positive impact on the quality of education. Colleges that successfully incorporate sustainability in educational material, teaching methodology, and university programs portray increased perceived learning effectiveness, relevance, and learning outcomes.

3.4 Figures and Tables

The outcomes of hypothesis testing show that there is stable support of the suggested relationships. The null hypotheses were rejected, and hypotheses associated with the effect of sustainability practices on student engagement and educational quality were accepted. Also, the hypothesis, which was based on correlation, proved that the positive relationship between the sustainability-related constructs was significant.

Table 5: Hypothesis Testing Results

Hypothesis	*Statistical Test*	*Result*
H_{01}	Regression A	Rejected
H_{11}	Regression Analysis	Accepted
H_{02}	Regression Analysis	Rejected
H_{12}	Regression Analysis	Accepted
H_{03}	Pearson Correlation	Rejected
H_{13}	Pearson Correlation	Accepted

4. Discussions

This study examined how sustainability-oriented institutional practices, implemented in alignment with India's National Education Policy (NEP) 2020, influence student engagement and educational quality in engineering and management institutions. The findings reveal that sustainability initiatives significantly shape student experiences when they are operationalized through curriculum design and institutional practices rather than remaining at the policy level.

The correlation results indicate that sustainability-related variables are strongly interconnected, suggesting that student engagement is influenced by a collective ecosystem of practices. Among these, campus sustainability communication demonstrated the strongest association with student engagement. This highlights that students respond more actively to sustainability initiatives that are visible, participatory, and embedded in the institutional culture. Regular communication through events, campaigns, and institutional platforms appears to strengthen students' sense of involvement and ownership in sustainability efforts.

The regression analysis further reinforced these observations by explaining a substantial proportion of variance in student engagement. Sustainable curriculum integration emerged as a significant contributor, indicating that embedding sustainability concepts within academic content enhances relevance and engagement. However, campus sustainability communication exerted the greatest influence, emphasizing the importance of experiential exposure beyond the classroom. These findings suggest that sustainability education is most effective when theoretical learning is reinforced through practical and communicative institutional actions.

Contrary to expectations, faculty sustainability evaluation and formal NEP policy alignment did not demonstrate a significant direct effect on student engagement. This outcome suggests that institutional compliance mechanisms and evaluation frameworks may not directly influence students unless they result in observable pedagogical or experiential changes. Policy alignment, therefore, functions more as a foundational enabler rather than an immediate determinant of student behavior. The results emphasize that implementation depth, rather than policy presence, determines educational impact.

Additionally, the analysis confirmed that sustainability-driven practices positively affect the quality of education. Institutions that systematically integrate sustainability into teaching and learning processes promote interdisciplinary thinking, ethical awareness, and problem-solving abilities. These outcomes align with NEP 2020's broader objective of transforming higher education into a holistic, learner-centered system.

If you are using *Word,* use either the Microsoft Equation Editor or the *MathType* add-on (http://www.mathtype.com) for equations in your paper (Insert | Object | Create New | Microsoft Equation *or* MathType Equation). "Float over text" should not be selected.

5. Conclusion

The current study presents empirical data that supported the fact that sustainable practices in line with NEP 2020 are critical in improving the level of student engagement and education in the engineering and management institutions. The results reveal that the most effective implementation of sustainability is in the cases where the institutions transform the policy goals into the changes in the curriculum and institutional initiatives, which engage students in the practical way.

The article concludes that the mere symbolic observation of national policy systems cannot produce any significant educational results. Rather, the institutions that put greater emphasis on practical implementation by designing their curricula based on sustainability, communication plans, and learning experiences can better fulfill the transformative aims of NEP 2020. These lessons lend more credibility to the fact that action-oriented institutional strategies are necessary to achieve policy-driven educational reform.

5.1. Implications of the Study

Theoretical implications and academic implications are discussed at 5.1.

The study is significant in terms of the literature in sustainability and higher education since it provides context-specific Indian empirical evidence. It contributes to the theoretical knowledge through showing the effects of sustainability-based institutional practices on student engagement and perceived educational quality to support implementation-based sustainability frameworks.

5.2 Policy Implications

The results provide the significance of transitioning the policy evaluation measures that are based on compliance to outcome measures. Although NEP 2020 offers a holistic framework, its success will be determined by the institutional capacity to put sustainability principles into practice. Implementation quality and student-centered outcomes should thus be promoted through accountability mechanisms that are advocated by policymakers.

5.3 Institutional and Managerial Conclusions.

Both institutions of higher learning are urged to:

- Integrate the ideas of sustainability in the academic curricula instead of making them single-subject courses.
- Enhance the use of institutional communication to facilitate sustainability awareness and engagement.
- Promote practical and project-based learning associated with issues of sustainability.
- Facilitate training programs that allow sustainability-oriented pedagogy among the faculty.

6. Restrictions and Future Research Suggestions

The study is also limited by some of its characteristics, such as its cross-sectional nature and limited area coverage, which can have some effects on the external validity of the results. Future studies may consider longitudinal studies to study the effect of sustainability programs in the long run. Further increasing the geographical area and using more precise analytical tools like structural equation modeling would make the future research even stronger. A qualitative or mixed-method study can also offer more insights into the institutional issues and best practices regarding the sustainability implementation.

References

[1] Bhat, K. A., and Ashraf, Z. 2023. National Education Policy (NEP 2020): An Academic Intuitive into the Reforms. IJAMR, 10(2), 22–28.

[2] Reshma, R., Vaddiraju, K., and Savitha, S. 2023. Appraisal of NEP 2020 for Higher Education. JEP, 2(1), 11–19.

[3] Pawan Kumar, 2022. Comparison of Educational Policies, International journal of Commerce and Law, 10(12), 1–7.

[4] Agale, S.P., 2023, The comparative Studies of Educational Policies in India After Independence, International Journal of Trend in Scientific Research and Development (IJTSRD), 7(5), 150-161

[5] Walia, A., 2020. Traditional Education versus Modern Education: A Reference to Indian Education system, International Journal of Research in Engineering, Science and Management, 3(1), 189–191.

[6] Roy, P. 2022. A Critical Study on the Holistic and Multidisciplinary Approach of NEP 2020 in India. IJER, 41(3), 45–58.

[7] Maharaj, R., Ahuja, S., and Malhotra, A. 2021. Implementation of NEP 2020: A Pedagogical Perspective from the Bhagavad Gita. JEP, 12(4), 56–68.

[8] Hassan, M. M. (2025). *Systematic literature review on the sustainability of higher education*. *Cogent Social Sciences*. https://doi.org/10.1080/2331186X.2025.2549789

[9] Kulal, A. (2024). *Evaluating the promise and pitfalls of India's National Education Policy 2020*. *SAGE Open*. https://doi.org/10.1177/21582440241279367

[10] Tarrant, M. (2021). *Exploring student engagement in sustainability education*. *Sustainability, 13*(22), 12658. https://doi.org/10.3390/su132212658

[11] Wardat, Y., & AlAli, R. (2025). *Sustainability in higher education: Challenges, innovations, and research prospects*. *Educational Pioneers International*.

[12] Singh, S. (2025). *A study on sustainable higher education*. *SCMS Journal*. Government of India, Ministry of Education. (2020). *National Education Policy 2020* (NEP 2020). https://www.education.gov.in/sites/upload_files/mhrd/fi les/NEP_Final_English_0.pdf

[13] Sundemo, M., Löfgren, Å., Yu, Y., & Scheidegger, S. (2025). *Mapping sustainability in higher education: A natural language processing analysis of student theses*. *Higher Education*, *Springer*.

[14] EPRAJournals. (2025). *From awareness to action: Sustainability integration in Indian higher education policies, frameworks, and curricula*. *EPRA International Journal of Research and Development*. https://doi.org/10.36713/epra24051