Empowering Rural Development and Enhancing Technical skills and Nurturing Universal Human Values of Students: Gujarat Technological University Innovative Initiative

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Abstract— This paper illuminates an inventive initiative by Gujarat Technological University (GTU) that encompasses rural development and the cultivation of universal human values within students. Engineering students, specializing in civil and electrical fields, plays a pivotal role, actively immersing themselves in a holistic project. Their involvement entails conducting vital techno-economic and demographic surveys in close coordination with local stakeholders and officials. A vivid illustration of this collaboration is evident through the case study of Jasapar village in Jamnagar, Gujarat. Beyond traditional classroom learning, this initiative offers a transformative real-world experience, fostering indispensable attributes like communication, leadership, teamwork, and empathy through profound community engagement. The project additionally serves as a crucible for technical growth, propelling students to navigate intricate challenges, design sustainable solutions, and bridge technology with societal welfare. As students translate theoretical insights into tangible rural benefits, their ability to innovate, adapt, and resourcefully optimize gains refinement. A significant facet of this initiative lies in its contribution to mitigating rural-urban migration, harmonizing with broader sustainable development objectives. . By synergizing surveys, analysis, and collaboration, students evolve into adept problem solvers and leaders. The initiative's impact extends beyond empowering rural communities with sustainable solutions; it nurtures the early-stage development of universal human values through direct communication with rural India. In this journey, the thought process itself emerges as a driving force, propelling communities towards comprehensive and sustainable development.

Keywords— Rural-urbanization, empathy, village development, universal human values, Real time problem, Skill enhancement. Vishwakarma Yojana

I. INTRODUCTION

THE sage words of Shri Mahatma Gandhiji, India's revered leader, resonate even today—"*The Soul of India lives in its villages.*" This sentiment remains pertinent as evidenced by the fact that as of 2011, more than 60% of India's population resides in rural areas. In contrast, urban populations have experienced a substantial surge, escalating from 17.97% in 1961 to 31.16% in 2011 (Indian government Census website, 2022) and (Sabyasachi Tripathi, 2022). This dynamic underscores the need for comprehensive strategies like the Vishwakarma Yojana to harmonize the rural-urban interface.

In the 21st century, one of the prominent challenges faced by developing countries revolves around the sustainable coexistence of rural and urban populations. Urbanization is witnessing a substantial migration of individuals from rural to urban areas, and this trend is particularly conspicuous in developing nations. This phenomenon underscores the increasing complexity of rural-urban dynamics. The Vishwakarma Yojana, an initiative by the Gujarat Government, addresses the intricacies of rural-urban interactions.

This paper elucidates a transformative journey ignited by the visionary initiative of Gujarat Technological University (GTU), one that not only tackles the complexities of rural development and urban migration but also significantly influences the growth of our students. This discourse is a tribute to the intrinsic value of nurturing rural landscapes to mitigate the gravitational pull of urban migration, and GTU's initiative stands as a testament to this commitment. Central to our

discussion is the profound impact on our student body, the aspiring engineers specializing in civil and electrical fields, who actively embrace this comprehensive endeavor. It is a harmonious amalgamation of techno-economic surveys, demographic analyses, and meaningful engagement with local stakeholders, echoing the praxis our students will encounter in their future professional domains. Beyond its utilitarian dimensions, this initiative embodies a crucible for personal and professional maturation. The students' experience transcends the realm of theoretical pedagogy, nurturing crucial life skills such as eloquent communication, leadership sagacity, the nuances of effective teamwork, and a heightened sensitivity to the communities they engage with. This undertaking also serves as a conduit bridging theoretical knowledge and tangible societal impact. It is here that our students grapple with intricate problem-solving, envision solutions within authentic contexts, and witness the symbiotic relationship between technology and community advancement. This immersive venture equips our students with the acumen to innovate, the resilience to adapt, and the discernment to optimize resources. Moreover, the paper underscores the initiative's ancillary effect in stemming the tide of rural-urban migration, aligning seamlessly with the broader framework of sustainable development. GTU's commitment to community-centered projects catalyzes the holistic growth of our students, nurturing their technical adeptness and augmenting their sense of social responsibility. In essence, this discourse speaks volumes about the potency of education and GTU's pioneering approach. It chronicles the students' transformative journey, whereby they evolve into adept problem solvers, poised leaders, and, above all, conscientious contributors to society. By instilling rural communities with sustainable solutions, our students-our researchers—realize their potential not only to shape their personal trajectories but also to co-author a more promising and harmonious future. The shift from rural villages to urban centers, coupled with transformations in employment structures, has far-reaching implications, impacting various facets such as local economies, livelihood patterns, community well-being, and social dynamics (Chetan et al., 2021). In the fiscal year 2012-13, the Government of Gujarat entrusted Gujarat Technological University with a significant initiative known as the Vishwakarma Yojana (VY) Phase-I. This endeavor, facilitated through the Commissioner ate of Technical Education, was aimed at fostering the holistic development of rural areas within the state of Gujarat. As part of the VY, several villages across diverse districts of Gujarat were allocated to final-year students pursuing civil and electrical engineering programs in affiliated engineering institutes under Gujarat Technological University's purview (Bhatt, 2022). The continuity of this project has been ensured, with successive phases extended annually, culminating in Phase XI by the year 2023.

As a result of this immersive involvement, students experienced significant enhancement in various 21st-century skills. Notably, the process of identifying real-life societal challenges fostered the development of critical thinking and problem-solving abilities among the students (Fadhlullah & Ahmad, 2017).

II. NEED OF THE STUDY

At the heart of this initiative lies the dual purpose of fostering rural development and nurturing our students' skill enhancement. The methodology devised by students' stands as a dynamic blend of quantitative and qualitative methodologies. Techno-economic surveys discern the community's specific technological requisites, while demographic analyses unravel the intricate tapestry of population dynamics and needs. However, the true essence of this approach lies in the students' active engagement with local stakeholders, including village leaders and officials. These interactions become the crucible for honing essential life skills, such as effective communication, empathetic understanding, and the art of collaborative problem-solving.

The case study, Jasapar village in Jamnagar district, Gujarat, embodies this methodology in action. This selection is underpinned by the village's distinctive demographic composition and socio-economic dynamics. Jasapar epitomizes the very challenges faced by rural communities grappling with the rural-urban migration conundrum. In this context, the impact of technological solutions becomes pronounced in maintaining the village's social fabric. The rationale for selecting Jasapar is grounded in its potential to serve as a microcosm for the broader challenges faced by rural communities in Gujarat, thereby offering a tangible context for our students to apply their burgeoning skills. Thus, the synergy between methodology, case study selection, and skill enhancement coalesces seamlessly to drive holistic development-both for the community and the students leading this transformative charge. (Khan & Arokkiaraj, 2021)

Beyond enhancing the well-being of the village, the project envisions fostering local industries, thus generating employment opportunities for both the village and its surroundings. This localized economic growth contributes to the overall prosperity of the nation, ultimately bolstering the national GDP (Peterson, 2017).

Additionally, the study accentuates the development of students' interpersonal skills and employability as a consequential outcome of their involvement in this initiative. Feedback collected from students upon the completion of their tasks provides tangible evidence of these advancements. As the challenges of the 21st century continue to evolve, the need to comprehensively address rural-urban dynamics and empower the rural populace remains a pressing concern, underscoring the significance of this study (Delgado & Moreno, 2022).

III. AIM AND OBJECTIVE

Aim:

The aim of this paper is to comprehensively explore and analyze Gujarat Technological University's (GTU) innovative initiative that encompasses rural development, universal human values cultivation, and student skill enhancement. The paper seeks to uncover the symbiotic relationship between these dimensions and their transformative impact on both students and rural communities.

Objectives:

- To evaluate the transformative impact of the Gujarat Technological University's initiative on

students, focusing on the holistic evolution of skill sets and empathetic consciousness.

- To assess skill enhancement among participating students through the analysis of responses gathered via a virtual questionnaire, particularly focusing on articulation, leadership, collaboration, and empathy.

- To analyze the collaborative efforts between students, local stakeholders, and officials through the case study of Jasapar village in Jamnagar, Gujarat.

- To understand GTU's commitment to integrating education, social responsibility, and skill augmentation in molding graduates into technically proficient and socially conscious change agents.

- To explore how education, as demonstrated through the Gujarat Technological University's initiative, serves as a potent catalyst for both student development and societal progress, with a focus on inclusivity and understanding.

- To present a comprehensive synthesis of the initiative's transformative power, demonstrating its potential in fostering a more balanced, inclusive, and prosperous society through the empowerment of rural communities and the cultivation of universal human values within students.

IV. LEARNING AND SKILL DEVELOPMENT

The initiative not only advances rural development but equally crucial, propels a profound transformation in our students' learning journey. The practical experiences garnered through this engagement form the bedrock of skill development, reshaping them into well-rounded individuals equipped for the challenges of the real world. Communication, often the cornerstone of success, witnesses a remarkable evolution. Students learn to articulate their ideas effectively, not just within their academic circles but also in the context of addressing real-world challenges. Leadership skills have nurtured as they took charge of different project facts, understanding the intricacies of steering a team towards a shared vision. Teamwork, fostered through collaborative interactions with local stakeholders, becomes a cornerstone. Students witness the power of collective intelligence, understanding that solutions are often multifaceted and require a collective effort. However, perhaps the most poignant transformation lies in the cultivation of empathy. Engaging directly with the community unveils perspectives, struggles, and aspirations that transcend the theoretical realm. Empathy becomes a tool not only for understanding but also for fostering sustainable change. Direct community engagement serves as the crucible for skill honing. Interacting with local leaders and officials refines diplomacy and problem-solving skills. Tackling real-world issues imbues students with a sense of responsibility, fostering the ability to remain composed under pressure and devise pragmatic solutions. In summary, the initiative's impact on skill development is transformative. As
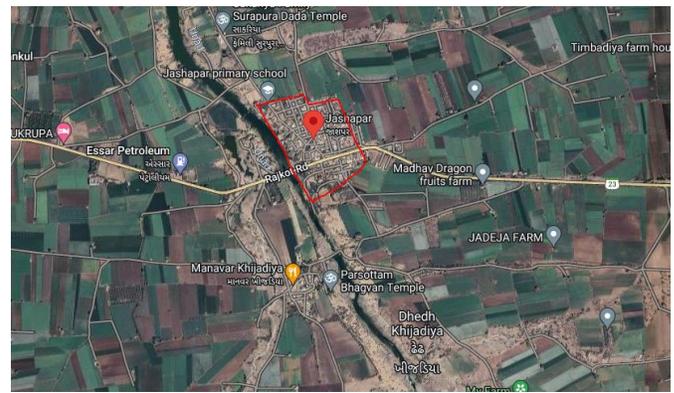

Fig. 1. Satellite View of Jashapar Village (Source: https://www.google.com/maps/place/Jashapar/@22.2123084,70.4195523)

students engage in practicality, their communication, leadership, teamwork, and empathy skills are fortified. It's within the tapestry of community engagement that these skills crystallize, marking a pivotal point in their holistic growth.

V. ABOUT THE PROJECT

Jashapar, situated in Kalawad Taluka of Jamnagar district, Gujarat, is a medium-sized village hosting 385 families. According to the Population Census of 2011, the village accommodates a population of 1927, with 936 males and 991 females. Fig 1 shows the satellite view of the village. Notably, 11.36% of the total village population comprises children aged 0-6. Jashapar's literacy rate is comparatively lower than that of Gujarat. In 2011, the village reported a literacy rate of 63.1%, while Gujarat's stood at 78.03%. Male literacy in Jashapar reached 70.1%, whereas female literacy was 29.9%. The governance of Jashapar is conducted according to the Constitution of India and the Panchayati-Raj Act, with a Sarpanch (Village Head) serving as the elected representative. While the village houses a primary school dedicated to educating its children, it currently lacks a primary health center, making access to primary medical care for individuals afflicted by diseases a challenge.

VI. PROBLEM IDENTIFICATION AND SOLUTIONS

The focus of this study centers on the inventive initiative implemented by Gujarat Technological University (GTU) aimed at tackling rural development challenges and mitigating rural-urban migration. The study adheres to the flowchart provided in Figure 2, while Figure 3 provides an overview of the condition of streets, roads, drainage, and sanitary facilities. The objectives of the study are elucidated through a structured methodology, detailed as follows:

A. Unveiling Real Challenges and Smart Solutions

In this section, we delve into the heart of the initiative's purpose, unveiling critical challenges faced by the rural community of Jasapar village in Jamnagar district, Gujarat. Through careful analysis, we present both the problems and the ingenious solutions devised by the students.
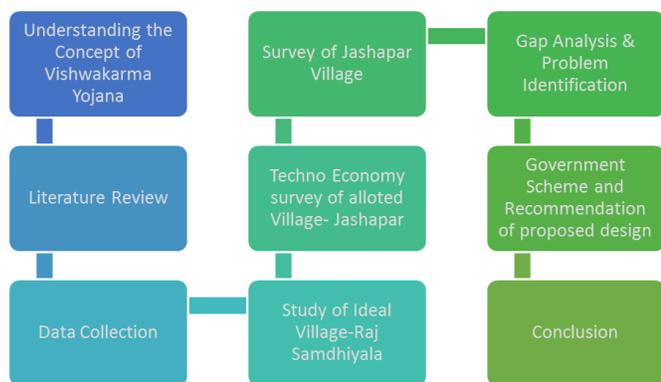
Fig. 2. Flowchart of Framework to development for Rural Development.

Fig. 3. Condition of road, drainage and sanitation at jasapar village.

Fig. 4. Meeting with gram-panchayat official

1) Lack of Sanitation Facilities

The absence of adequate sanitation facilities hinders the village's progress. To counter this, the students propose a **Practical solution:** the establishment of a well-equipped public toilet facility. Students have submitted detail design and complete cost estimation.

2) Higher Education Gap

The absence of accessible higher education opportunities poses a hurdle to the community's growth. The students, driven by their commitment to holistic development, suggest the creation of secondary and higher secondary educational institutions.
Practical solution: In a collaborative effort, students and the village head convened a community meeting, engaging

in discussions to address challenges. The consensus was to invite BHGCET students who volunteered to teach those unable to afford higher secondary education. Additionally, a proposal for the design of a higher secondary school was put forth.

3) Road Infrastructure Deficiency

Subpar road facilities impede the village's connectivity. Recognizing this, the students advocate for the maintenance and repair of existing roads, ensuring smoother transportation routes.

4) Drainage Conundrum

Inadequate drainage systems lead to myriad challenges. The students' response is a pragmatic one – an economically viable design for efficient drainage solutions.
Practical solution: Students communicated the issue with villagers, prompting a joint effort where numerous villagers and college students came together to initiate a village-wide cleaning drive. Simultaneously, they conducted educational sessions to enlighten the villagers about safety and sanitation practices.

5) Water Storage Necessity

A dire need for water storage solutions is identified. The students' solution encompasses the construction of overhead water tanks.
Practical solution: Students facilitated the education of villagers on efficient rainwater harvesting for drinking purposes by using physical, miniaturized models to convey key concepts within the community.

The holistic understanding of these problems and the students' innovative solutions form the crux of our investigation. As we navigate through these challenges and solutions, the transformative potential of GTU's initiative unfolds, spotlighting the profound impact on both rural communities and student development.

B. Design Proposals:

Embedded within the broader initiative's framework, this section delves into the meticulous design proposals that emerged as a result of comprehensive observations and techno-economic surveys. These proposals encompass multiple dimensions, addressing not just infrastructural needs, but also aspects of sustainability and social welfare.

1. General Observations Guiding Techno-Economic Surveys

The essence of our approach lies in conducting techno-economic surveys, encapsulating a diverse spectrum of observations. We delve into the core pillars that uphold sustainable community development:

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a. Physical Infrastructure Facility: Our analysis comprehensively examines the village's physical infrastructure. The design proposals align with this evaluation, envisaging enhancements that cater to essential needs.

b. Social Infrastructure Facility: Recognizing the integral role of social institutions, our proposals extend to social infrastructure. We envision solutions that fortify the social fabric, fostering growth and empowerment.

c. Sustainable Infrastructure Facility: Sustainability underscores our initiatives. The proposed designs not only address immediate requirements but are rooted in sustainable practices, ensuring lasting positive impacts.

2. Design Proposals Envisioning a Transformed Landscape:

Within this context, a plethora of design proposals has emerged, each tailored to address specific needs. These encompass:

i. Bio Gas Plant: A sustainable solution addressing both waste management and energy generation.

ii. Solid Waste Management: A comprehensive system to manage waste effectively, contributing to cleaner surroundings.

iii. Primary School: A beacon of education, cultivating knowledge and empowerment within the community.

iv. Water Tank: Ensuring access to a vital resource, promoting well-being.

v. Public Toilet: A step towards improved sanitation and community health.

vi. Community Hall: A space fostering social interactions, knowledge exchange, and community cohesion.

vii. Wastewater Treatment Plant: A sustainable response to the challenge of wastewater management.

VII. STUDENT SKILL ENHANCEMENT AND EMPATHY CULTIVATION

This section delves into the transformative learning experiences that students undergo as they actively participate in Gujarat Technological University's (GTU) initiative. It elucidates the profound impact of the initiative on their skill enhancement and empathetic growth.

A. Practical Learning Experiences

The initiative serves as a dynamic laboratory for students, enabling them to translate classroom knowledge into practical applications. Through hands-on engagement in techno-economic and demographic surveys, students gain insights into real-world challenges and solutions. This direct exposure equips them with a deeper understanding of the complexities that underlie rural development.

B. Enhancement of Key Skills

The initiative's immersive nature results in the substantial augmentation of various critical skills among students. Communication proficiency is honed as students interact with local stakeholders and officials, bridging the gap between theoretical concepts and effective conveyance. Leadership aptitude flourishes as students navigate the project's multifaceted challenges, steering teams towards common goals. Collaborative teamwork becomes second nature as students synergize their efforts to address diverse aspects of rural development. Importantly, the initiative nurtures empathy, as students immerse themselves in the community, gaining a profound understanding of its aspirations, struggles, and needs.

C. Cultivation through Community Engagement

The initiative fosters these skills through meaningful community interaction. As students collaborate closely with villagers, local leaders, and officials, their communication skills are refined through dialogue, presentations, and information dissemination. Leadership traits come to the fore as they initiate and oversee projects, learning to guide and inspire their peers. Teamwork thrives as they work alongside community members, collectively identifying problems and devising solutions. Through these interactions, empathy takes root, as students witness the real impact of their actions on the lives of the community. Empathy becomes more than a theoretical concept; it evolves into a driving force motivating students to contribute positively to societal development.

In essence, this section unravels the dynamic interplay between student growth and community engagement within the context of GTU's initiative. As students' skill enhancement and empathy cultivation progress hand in hand, the transformative potential of education materializes, creating a symbiotic relationship between their self-development and society's welfare.

In an interview, a participating student expressed the enjoyment of the vibrant village life and connection to its rooted culture. They emphasized the fulfillment derived from contributing to the well-being of underprivileged individuals, educating them for the challenges of the 21st century despite having only basic physical facilities. The experience showcased the students' appreciation for humanity, leaving them grateful for the opportunity to make a positive impact.

VIII. SKILL ENHANCEMENT ASSESSMENT: A MEASURE OF TRANSFORMATIVE GROWTH

Integral to understanding the impact of the initiative on student development, this section delves into the meticulous process of gauging skill enhancement. A virtual questionnaire, meticulously designed, served as the conduit for evaluating the evolution of participating students' proficiencies across distinct phases of the project.

A. A Holistic Measurement Approach

Intricately woven into the study's fabric, this survey sought to chart the growth trajectory of various skills acquired by the students. The scale employed, ranging from 0 to 5, served as

TABLE I
SURVEY RESULT OF PBL FOR DIFFERENT PHASE OF PROJECT

Skills	Score allocated by the students					Total Response
	1	2	3	4	5	
Teamwork	0	3	6	8	13	30
Problem Solving	0	1	4	5	20	30
Creativity	0	0	4	8	18	30
Empathy	0	1	10	12	7	30
Self-Confidence	0	2	9	11	8	30
Critical Thinking	0	1	6	13	10	30
Perseverance	2	5	13	7	3	30
leadership	0	1	4	14	11	30
Curiosity	0	2	8	16	4	30
Empowerment	0	0	9	14	7	30

a nuanced yardstick. A rating of 0 signified the initial skill level, while a rating of 5 indicated the pinnacle of enhancement. This approach ensured a comprehensive appraisal, transcending mere quantification and capturing the qualitative essence of skill progression (Table-1).

B. Student-Centric Evaluation

Students' voices formed the cornerstone of this assessment. The virtual questionnaire solicited their insights, inviting them to candidly rate their perceived growth across an array of skills. The multidimensionality of this evaluation encompassed skills spanning effective communication, leadership acumen, teamwork prowess, and empathetic engagement.

C. A Window into Transformative Journey

Through this survey, the transformative journey embarked upon by the students unfurled. Their self-assessment, anchored in the diverse phases of the project, illuminated the metamorphosis from novice to proficient individuals. The scales served as narratives, recounting stories of heightened communication finesse, burgeoning leadership traits, cohesive teamwork, and the profound empathy instilled by engaging directly with the community.

In the backdrop of these ratings lies the crux of our exploration—the intersection of academic learning and the tangible cultivation of life skills. As we navigate through the data gleaned from this assessment, the symbiotic relationship between academic knowledge and personal growth comes to the fore, underscoring the intrinsic value of experiential learning within the context of real-world challenges.

IX. CONCLUSION: A TRANSFORMED STUDENT AND SOCIETY

In the realm of student growth, this journey has been transformative - a metamorphosis that mirrors the holistic evolution of both skill sets and empathetic consciousness. The culmination of Gujarat Technological University's initiative is not merely reflected in infrastructural development, but equally in the nurtured capabilities of participating students.

The assessment of skill enhancement, as gauged through the virtual questionnaire, portrays a vivid tapestry of growth. The students' ability to articulate, lead, collaborate, and empathize emerges as more than numerical increments. It is an embodiment of their journey from learners to practitioners, from novices to proficient contributors.

Amidst this transformation, the cultivation of empathy stands as a beacon. As students interfaced directly with the community, their understanding deepened. The theoretical constructs of classrooms became contextualized within real-world experiences. This shift in perspective, this awakening to the society's pulse, embodies the essence of universal human values. Empathy transcends the boundaries of academic disciplines; it is a fundamental trait that resonates with societal advancement.

In this context, the initiative underscores the resonance between skill enhancement and empathy. As students develop communication acumen, leadership finesse, teamwork efficacy, and empathetic understanding, they are not merely building their personal profiles, but also contributing to the universal values that underpin a harmonious society.

The journey of this paper, traversing student skill enhancement and societal development, intertwines two narratives that converge at a juncture where education becomes a potent catalyst. The growth of skills and the nurturance of empathy aren't just indicators of personal development—they are the touchstones of a society evolving towards inclusivity, understanding, and shared progress. This paper is an ode to the transformative power of education, where both students and society emerge elevated, embodying the universal human values that transcend academic confines.

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