

# Participatory Approach to Engineering Service Learning Programs - Quality Framework for the Implementation of Unnat Bharat Abhiyan Program in Indian Engineering Institution

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**Abstract**— Unnat Bharat Abhiyan (UBA) is a national-level service-learning program launched by the Ministry of Human Resource Development in India that aims to support rural development through the active participation of Higher Education Institutions. Towards building service and community-based learning programs, researchers and practitioners worldwide have called for critical, mindful, ethical, and reciprocal partnerships to be created with communities by considering issues of power and privilege held by the higher education institutions. This study adopted a participatory development approach at a private engineering college in India to design a service-learning program under UBA. Twelve engineering and science faculty from multiple disciplines collaborated with two engineering education researchers to form a Community of Practice. As a critical outcome, the discussions in the CoP led to the formation of a quality framework containing core pillars, principles, and action guidelines for an engineering community-based learning program.

**Keywords**—service-learning, university-community partnerships, participatory approach, community-based learning

## I. INTRODUCTION

Engineering education has witnessed an increase in the adoption of service-learning as pedagogy and an approach to building partnerships with local communities. Service-learning experiences have been shown to prepare students with 21<sup>st</sup>-century competencies through the opportunities to interact and build relationships with community partners, critique, identify and collaborate to solve real-time problems, and reflect on the entire experience to understand their role in society [1]. Research has identified that service-learning experiences and guided reflections help students understand their discipline, develop an enhanced sense of civic responsibility, and benefit the community [2]. The development of civic outcomes among students is also emphasized in Indian National Education Policy which envisions an education system that would instill ethics, human, and constitutional values among the students [3].

The government of India has launched a national-level program – "Unnat Bharat Abhiyan" (UBA), a Hindi term that translates to "Holistic Development of India." UBA was

conceptualized to promote higher education institutions to adopt service-learning as an approach to teach students how to engage with nearby rural communities, build partnerships, and apply their academic learning to develop technology solutions that will lead to the holistic development of the community. UBA was conceptualized with a vision to bring out a transformational change in Indian rural development with the support of higher educational institutions to build an equitable and inclusive India. The goal of UBA is to sensitize educational institutions to partner and work with rural communities to understand their history, culture, lifestyle and develop a sense of appreciation towards their contribution to the country. Participating institutions, in return, can leverage their research and innovation and explore how they could be applied to community-based problems. As part of the program, higher education institutions are expected to partner with five nearby rural communities, interact with the community members to build awareness, empathize, and collaborate to initiate various development projects that would collectively contribute to their social and economic development.

The vision of UBA is ambitious as we consider the current state of Indian rural communities, which account for 65% of the Indian population. Such a large-scale transformational initiative would require all higher education institutions to build sustainable partnerships with the community, which would lead to meaningful collaborations and long-term impact. Building sustainable partnerships have been reported to be challenging and time-consuming [4] and would therefore require a participatory approach to foster reciprocal partnerships that would lead to impact at the grassroots level. Community engagement and shared responsibility would be critical to realizing the vision of Unnat Bharat Abhiyan, as the community members need to be part of their development and be accountable for the design and sustainability of solutions that will be created. However, institutions implementing service-learning in India involve neither the community nor the faculty of individual institutions in designing and implementing the learning program. Therefore, an understanding of the participatory approach by the institutional faculty, students, and the partner

communities could build reciprocal relationships between all the stakeholders and significantly boost the potential impact created by national-level programs like UBA on Indian rural communities. The paper presents a case study of the participatory approach that an engineering institution in India took to adopt and implement the Unnat Bharat Abhiyan program. The case study presented could be helpful to other engineering institutions in India that are adopting the Unnat Bharat Abhiyan program and implementing service-learning programs.

## II. LITERATURE REVIEW

Bringle and Hatcher define service-learning as a credit-bearing educational experience in which students participate in an organized service activity that meets identified community needs and reflect on the service activity in such a way as to gain further understanding of course content, a broader appreciation of the discipline, and an enhanced sense of civic responsibility [5]. Service-learning is a pedagogy that has four characteristics – service, academic connection, reflections, and reciprocal partnerships [6]. Service is considered a central component as students work with partner communities to develop solutions that would benefit the community. In addition, faculty must ensure that students collaborate with the community members and develop solutions by applying the subject knowledge they gained from the course curriculum. As part of the service-learning experiences, students should be provided with guided reflections that would encourage them to analyze the solution being developed, the process that was followed, and the potential impact being created in the company [7]. While most of the service-learning research has focused on student outcomes, there have been consistent calls for research on community perspectives to understand the reciprocal relationship between both the stakeholders (i.e., higher education institutions (HEIs) and the community) [4]. Reciprocal partnerships are considered one of the cornerstones of the pedagogy since building trustworthy relationships would be essential for all the stakeholders to benefit from the partnership [8].

Research in service-learning on the long-term sustainable community impact with sixty-seven community organization representatives about their service-learning experiences have revealed that not all partnerships resulted in community impact, and institutions have to put more effort to communicate and build relationships with them [9]. For example, students who are part of service-learning courses for a semester might not commit to the project after they put the required effort to receive credit for the course. Such partnerships, which are more focused on academics and less on community impact, tend to impact the trustworthiness of relationships built between the institution and the community. Without reciprocal partnerships, the core purpose of the service-learning will not be met, and such an approach could lead to negative consequences on the partner communities [8].

### A. Unnat Bharat Abhiyan Program

Unnat Bharat Abhiyan (UBA) is a national-level service-learning initiative launched by India's Ministry of Human

Resource Development with a vision to promote community engagement among higher education institutions intended to contribute to the socio-economic development of rural India [10]. The program aimed to engage faculty and students with rural communities to understand their realities, culture, and lifestyles. Through the program, higher education institutions would collaborate with members from the partner communities to identify their weakest linkages, which could be addressed through technological innovations. UBA has five focus areas of collaboration between institutions and the community – basic amenities, artisans, industries and livelihood, water management, renewable energy, and organic farming. Institutions are expected to partner with five nearby villages and explore the community's needs in the five focus areas. Based on the community needs analysis, institutions need to work with the community leaders, youth, women, and local government officials to prepare a village development plan for each village. The technological solutions developed later in collaboration with the institutions are encouraged to be aligned to the village development plan as it would enable long-term development through a strategic approach. UBA promotes institutions to build long-term partnerships with the community for sustainable development. A participatory approach to engage with the rural communities is essential to achieve the vision of UBA as it would help the institutions build trustworthy relationships with the community members. We have adopted a participatory approach that could serve as an effective model to address some of the critical gaps identified in the literature and also contribute to the numerous benefits that have been discussed in the literature.

## III. METHODS

The UBA program is unique in its flexibility for HEIs to implement community-based learning based on the context and institution-community relationships. While the UBA program offers a structural model, it allows each institution to choose the methodology and approach for implementation, beginning from establishing a partnership with villages to installing engineering products addressing problems. Our program aims to capitalize on this flexibility to maximize the potential of mutually beneficial partnerships and sustainable development. However, as an affiliated institution to a regional university, the overseeing university established our general curriculum and program model. For the past 10+ years, our faculty have followed the pre-designed curriculum and course structure to educate students. Though some of the faculty have attended workshops and training on engineering education topics such as Scholarship of Teaching and Learning (SoTL), Student-Centered Learning, and Active and Blended Learning, the concept of community engagement was not a familiar model for majority of the faculty. Those who participated required knowledge on community engagement and a shift in their beliefs and attitudes towards engineering teaching and learning. Similarly, the village communities have not had an institutional partnership in the past. While we collected accounts of Non-Governmental and Research Organizations' involvement, they often took the primary role in the process and engaged with the village members only as data sources, a key challenge reported in rural development programs [11].

A participatory approach, lauded as the "people's approach", provides an apt framework for engaging multiple

stakeholders in design and development [12]. The participatory approach has grown with post-positivist desires to question and challenge conventional approaches that often position power and authority with the institution. What makes a process participatory is the stakeholder's depth of involvement in the process [13]. In the field of engineering education and service learning two scholarly articles provide a useful framework that provides models for discussing stakeholders participation and collaboration. Thompson & Jesiek [14] explain three types of partnerships between an institution and a community: transactional, cooperative, and communal. Positioned across this spectrum are issues of power relationships in community engagement. Similarly, Dostilio et al., [15] explored the concept of reciprocity in service learning programs and identified three different forms of reciprocity: exchange, influential, and generative. The exchange represents mutually agreed upon transactional relationships, influential represents community partners role modeling and influencing the relationship nature across time, and generative as entirely communal or participatory. Both of these articles do not discuss one form of partnership or reciprocity as superior to the other. Still, they present the benefits of aligning with the communal partnerships or generative reciprocity as a cornerstone for equity. Therefore, to create a communal partnership and achieve generative reciprocity, we believe the participatory approach provides the necessary framework. Therefore, we adopt the participatory approach from the start of the UBA program.

In our program, the participatory approach is designed to be implemented in two stages—first, a participatory design approach with a selected group of 10 faculty at the institution. This stage has now been completed with the engagement of faculty members and two engineering education researchers to collaboratively train and design the quality framework to ensure sustainable and equitable community engagement programs. The second stage, is currently under implementation, the faculty and students at the institution engage with village representatives and members in a participatory design and research to scope and solve problems in their respective communities. Since only the first stage is completed, in this paper we discuss the outcomes of this first stage, which is quality framework.

In the beginning, the faculty and researchers identified the goals and objectives for the team to design the UBA program, which led to multiple steps of design. Here we discuss those steps in detail.

1.) As a first step, the faculty requested training on related topics to help orient themselves to the philosophy and trends in community engagement. The first author then developed a list of relevant topics and shared it with the team for validation. Upon approval, the first author designed training content on service-learning, community-based learning literature and theoretical frameworks, asset-based community development, and participatory rural design and development. These topics were then covered in a six-week-long training program. At the end of each week, the faculty were asked to reflect on their learning through reflection prompts.

2.) As a second step, the faculty reflections were collected then analyzed. The first author then qualitatively identified patterns across the reflections and then grouped them under categories. Categories were formed inductively, when a specific attribute or quality for service-learning was

emphasized. For example, multiple faculty members discussed the need for consistency in the number of visits to the community to ensure mutual learning. So they were listed under the category of mutual learning.

3.) At the end of the training, these categories were formulated and presented back to the faculty members for a larger group discussion. At the larger group discussion, the faculty members and researchers collaboratively evaluated each item on its applicability to the context, community, and the institution.

4.) A draft quality framework was developed after the larger group discussion. Soon after this, the faculty members visited the partnering villages as a team and met with representatives and a portion of the residents. Each faculty spent approximately 5-6 hours in each village. During the visit, the faculty discussed the purpose of collaboration and requested input on community members' structure and design of partnership. After which, the faculty reflected on their experiences in the field and on community members' inputs.

5.) As a final step, the final reflections of the faculty after the field visit were explored to note any changes needed on the framework, and further edits were made.

At each stage of the quality framework design, authors 1 and 2 discussed the development with author 3 for guidance and mentorship. Author 3, as an engineering education researcher and expert in community-based learning programs, provided critical feedback on the framework and strengthened its quality.

#### IV. RESULTS

This section discusses the components of the quality framework developed (presented in appendix A). The overall framework comprises core pillars, principles, and action guidelines. Inductively coding the data resulted in the generation of principles as assertions and then core pillars as the key thematic categories. The principles were arrived by reading and discussing the common aspects across all faculty's reflections. These principles were then grouped together under common thematic areas to form pillars. Action guidelines were then drafted to support the implementation of each principle. The core pillars describe the broad categories of critical parameters involved in a campus-community partnership. The core pillars are then associated with principles that guide the values for each pillar. The principles are then associated with action guidelines that inform the action steps to achieve the goals of a participatory, asset-based, community-based learning program. We briefly describe below each pillar and present the detailed quality framework in appendix A.

##### a. Community Collaboration

We reviewed and critically looked into literature for best practices and existing gaps in community collaboration and identified six fundamental principles. These principles were generated via discussions and analyzing faculty reflections. We present the key arguments and descriptions from the literature that was identified by the faculty and researchers supporting this pillar and its principles. The principles are briefly described below:

- Mutual learning and respect – to ensure community and campus are learning from each other towards a

shared goal and inherently valuing knowledge and practices as critical

- Joint participation and negotiation – to ensure tasks are carried out jointly and decisions are agreed upon mutually through dialogue
- Equalize power relations – to ensure power and privilege of each stakeholder is understood and equalized through shared roles and responsibilities
- Decolonize community engagement – to shift from student-centered and institution-centered to community-centered program and partnership through asset-based approaches
- Sustainable community development – to ensure long-term planning and design to sustain projects and independently by the communities
- Inclusive language – to ensure attention to inclusive language and appreciation of differences in the collaboration

A campus-community partnership is a "bidirectional interaction and communication between community stakeholders and the institution to create mutually sustaining impact" [16]. It is an activity that is community-centered and one that is based on democratic dialogue [17]. A core purpose of the campus-community partnership lies in sustaining benefits for the community while leveraging the opportunity for institutional goals of teaching and learning. While many forms of campus-community partnerships exist, service-learning has been majorly applied and represented as a model. However, service-learning is heavily critiqued for not being community-centric [18], and that research has primarily been focused on the benefits of institutions. A recent systematic review on community engagement in engineering education concurred with this gap and called for research from the community's perspectives. Faculty reflections were associated with these literature arguments. For example, one of the faculty noted in her reflection note, *"to spend time with the community and working with them and trying to learn from them is the best method because we don't know their lives."* This quote contributed to the principle of mutual learning and respect. Another faculty reflected, *"Our communication should be clear, consistent, and understandable to community members to make the interaction relevant and engaging."*

#### b. Student Engagement and Learning

Five principles were generated under the theme of student engagement and learning.

- Civic responsibility – to ensure that the students understand the role of engineering for societal development and their role in applying learning to benefits of society, in particular, the rural context
- Credit-based – to ensure that engagement and learning are appraised through credit-bearing outcomes to acknowledge students learning
- Alignment with theory and practice – to ensure that the curriculum aligns relevant theories of experiential learning with practice on the field
- Peer mentoring and exploration – to ensure that peer mentoring is structurally integrated into the program

and allow students to have collaborative autonomy to explore and engage on the projects

- Experiential learning and reflection – to ensure students are active participants, and practice reflection

The following literature arguments and faculty reflection quotes provide a case for this pillar. Student engagement and learning, the most commonly researched and addressed aspect of a campus-community relationship, is critical to the design and success of programs. Research has shown repeated benefits of service-learning programs on student learning outcomes [19]–[21]. Students have reported higher course satisfaction, demonstrate higher academic performance and critical thinking skills, and apply learning to real-life situations [22]–[24] from service-learning programs. It has also been shown to increase students' civic responsibility [25] and professional and cultural competencies [26]. Based on reading these literatures, faculty reflections noted key aspects of student learning. For example, a faculty noted, *"Students must show a passion for community engagement and should acquire skills such as planning and organizing, taking responsibility, taking initiatives, teamwork, problem solving, and communication."*

#### c. Engineering Learning Outcomes

The engineering learning outcomes were decided as a separate quality pillar than the student learning given the specific nature of outcomes on engineering. Over the last few decades, engineering education has gone through significant shifts worldwide, whereby the technical STEM knowledge that was predominant in engineering has been complemented with additional focus on engineering design [27]. Engineering problem-solving and design is seen as a critical outcome for the engineering students that allows them to practice iterative design process to apply scientific knowledge to real-time challenges [28]. Service-learning and community engagement are seen as effective techniques of increasing students understanding and practice of design skills [29]. Therefore, we generated four principles associated with the engineering learning outcomes pillar.

- Collaborative engineering problem-solving – to ensure learning and practice of systematic problem-solving approach with the community
- Collaborative design – to ensure the practice of informed design with the community
- Appreciation of the discipline – to ensure that the students and community appreciates the role of engineering in societal development
- Impact of design choices – to ensure that students and the community critically reflect and realize the impact of design choices and understand the iterative process.

Faculty reflections after reading specific literature on service-learning models, and participatory design, noted specific strands related to engineering activities and learning. For example, one faculty reflected, *"we have to rethink how we intend to approach the village communities. We should not approach them as we are the problem-solvers, but we want to work with them to solve problems."*

#### d. Faculty Engagement and Assessment

One of the critical gaps in engineering service-learning literature is the role of faculty and their perspectives towards the design of campus-community partnerships [30]. Discussions and reflections highlighted how, in particular, in India, service-learning is demanded by the institutions as necessary for the institutions' goals that require severe time and resource commitments by the faculty. However, these activities are often kept out or minimized in weightage during faculty assessments and appraisal systems. Faculty are primarily valued and appraised on research activities, publications, teaching tasks on campus, and service for the institution's administration. The time they commit to building partnerships with a community, undertaking field visits, carrying out projects, mentoring students and community members are not equally valued. Therefore, we reviewed models in literature and practice to better understand the appropriate ways to support and appraise faculty for their engagement in campus-community partnerships. Based on that, we generated five principles.

- Knowledge, skills, and attitudes on Campus-Community Partnership – to ensure that the faculty possess required knowledge and abilities and orient their philosophy to participatory and equitable campus-community partnerships
- Research-informed practice – to ensure that the faculty understand the role of research to inform practice and therefore practice and build evidence-based approaches for their engagement
- Research-oriented practice – to ensure that the faculty conduct research in collaboration with the community to generate critical knowledge from these unique programs and practice participatory, equitable, and ethical research methods
- Community Engagement in performance assessment – to ensure that the institution used faculty's role in community engagement activities as critical and equal parts in their performance assessments
- Multidisciplinarity – to ensure that interdisciplinarity is fostered

## V. DISCUSSION

The four pillars in the quality framework which emerged from the participatory approach taken by the faculty in the institution to plan for the implementation of the Unnat Bharat Abhiyan program has started to guide other activities in the institution. The following are different approaches taken by the institution to incorporate the principles of the quality framework into the design and implementation of other service and community-based learning activities.

### 1. Inclusion of Community Immersion Experiences.

Faculty in the institution have introduced community immersion experiences as a mandatory first step before any community engagement activities. During the community immersion experiences, faculty or students spend 2-4 working days with the community from morning to evening to learn from the different stakeholders in the community. The immersion experiences start with a detailed discussion of the

traditions, culture, and lifestyle with the community leaders, followed by a community tour for faculty and students. After the tour, interactions are planned with various stakeholders in the community such as leaders, youth, women, entrepreneurs, elders, children, etc., to provide faculty and students with lived experiences of the community. The community immersion experiences were inspired by the core pillar of community collaboration and the principles of mutual learning and respect, equalizing power relations, decolonizing community engagement, and inclusive language. The community immersion experiences are aimed to build long-term reciprocal relationships with the various stakeholders in the community that could lead to a sustainable partnership between the institution and the community.

### 2. Community-Centered Design Approach

The community immersion experiences are expected to provide faculty and students with lived experiences of the assets, culture, lifestyles, and challenges encountered by the various members of the community. The participatory approach also continued after identifying problems where students were encouraged to identify "GramNayak's" (community champions) who would collaborate with them to co-develop technological solutions and later deploy them in the community. Students are expected to work with the GramNayak's at various stages of the design process from problem scoping, ideation, concept generation, detailed design, prototyping, and testing. The local knowledge of the GramNayak's is considered critical to the design process's decision-making. It would ensure that the design is community-centric and would be later accepted and used by the community members. The principles from the core pillar of community collaboration - mutual learning and respect, joint participation and negotiation, equalize power relations, decolonize community engagement, and core pillar engineering learning outcomes – collaborative engineering problem-solving and collaborative design have helped adopt the community-centric design approach to develop technological solutions for them.

### 3. Community-Centered Courses for Students

The quality framework was used to design four new courses for all first- and second-year students in the institution making community engagement and development an essential component of its vision and mission statement. The four courses – Design Thinking and Sustainable Development (semester 1), Innovation for Rural Development (semester 2), and Social Innovation I and II (semester 3 and 4) have community-centric participatory approaches to the design and implementation of the courses. The community immersion experiences are included as core components to the Innovation for Rural Development course and the community-centric design approach was used to design the evaluation guidelines and rubrics for Social Innovation Courses. All courses require students to reflect on their engagement with the community as mentioned in the core pillar student engagement and learning and the principle experiential learning and reflection.

### 4. Faculty Development Programs on Community-based Learning

The team designed multiple faculty development programs to build capacity among the faculty to get involved in the multiple community engagement programs being initiated. The programs are focused on the following topics

- Introduction to Service and Community-based Learning
- Crafting Problem Statements for Engineering Design Projects
- Assessment of Students Learning in Community-based Projects
- Building Reciprocal Partnerships with Community
- Participatory Research with Community.

All the workshops are aimed to instill the principles of mutual learning and respect, joint participation and negotiation, equalizing power relations, sustainable community development, inclusive language, knowledge attitude and skills of service-learning, and research-informed practice among the faculty. As shown in appendix A, the quality framework has started to inform the design, practice, and evaluation of various community-engagement-related activities in the institution.

## VI. CONCLUSION

This paper presents our first steps to adopting a participatory development approach with faculty at an Indian HEI to implement a reciprocal community-based learning program. As a result, a quality framework has been developed as an evaluation checklist and a procedural guideline for the HEI and community. Our efforts show that four thematic areas have been identified as the SLprogram's critical pillars. These pillars explain the significance of building a reciprocal and meaningful community partnership and a sustainable learning program. From our experiences and results, we contend that the participatory approach provides the best methodological and epistemological guidance for community engagement and, therefore, calls more HEI institutions to adopt and investigate participatory approaches.

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Appendix A. Quality Framework for Implementing Campus-Community Partnership at a HEI in India

<b>Core Pillars</b>	<b>Principles</b>	<b>Action Guidelines</b>
<b>Community Collaboration</b>	<i>Mutual learning and respect</i>	Learn FROM the community and work WITH them
		Build rapport through scheduled, organized, and regular visits
		Regular visits to the villages/communities, to understand social, political, economic, cultural, and technological environment
		Identify all relevant stakeholders and recruit representatives (e.g., government, non-governmental, community, private, etc.)
		Practice inclusion and give everyone an equal voice (during meetings, discussions, brainstorming, etc.)
		Build relationships in smaller groups and expand with time
		Go to where people are
		Practice inclusivity: Gender equity, non-discrimination
		Value indigenous community knowledge systems as much as other knowledge systems
	<i>Joint participation and negotiation</i>	Adopt participatory design approach and principles
		Ensure agreement to decisions
		Co-create and co-generate ideas, decisions, and actions
	<i>Equalize power relations</i>	Include relevant community members and practitioners as teachers for the students
		Create learning sessions facilitated by community members
		Facilitate conversations, learning, and development (not prescribe)
		Prompt reflection and refine positionality of faculty, students, and community stakeholders
	<i>Decolonize community engagement</i>	Adopt asset-based community development approach
		Acknowledge everyone's abilities and value
		Practice people-centered rather than technology/system-centered
		Ask and consistently invite the communities for decisions and actions
		Identify assets and needs collaboratively
	<i>Sustainable community development</i>	Create long-term plans with the community to build on the assets and address the needs
		Engage the community to create a community vision and plan
		Prioritize educational and training goals for the community as equally as the engineering and technological goals
		Create shared ownership with the community on completed projects
		Identify and support income generational opportunities for completed projects
		Negotiate on intellectual property rights based on equitable evaluations
<i>Inclusive language</i>	Communication with community members should be clear and effective	
	Avoid 'service', 'provider', 'giver', 'adopt' language that reinforces charity ideologies	
	Utilize constructive language to value everyone's assets and abilities without discrimination	
	Acknowledge and appreciate cultural differences	
	Pay attention to gender, race, caste, sexual orientations in the community and respect without differences	
<b>Student Engagement and Learning</b>	<i>Civic responsibility</i>	Educate students on social issues
		Integrate community-based engineering into on-going curriculum and align learning outcomes
		Facilitate learning and comprehension of real-world situations in rural communities
		Develop an appreciation of rural culture, lifestyle, and indigenous knowledge system
		Assist students in gaining knowledge on rural development programs (governmental, and non-governmental)

	<i>Credit-based</i>	Create credit-system and value pathways for students participating in community engagement
		Potential pathways: certifications, recommendation/reference letters, course credits, project incentives
	<i>Alignment with theory and practice</i>	Meaningfully link curriculum and courses to social innovation projects
		Identify learning objectives in courses that can be achieved through community engagement
		Create structured activities to translate theory into practice
	<i>Peer mentoring and ownership</i>	Identify and mentor student leaders to be peer teachers
		Integrate evidence-based peer mentoring approaches
		Include weightage for peer mentorship and teamwork in student assessments
	<i>Experiential learning &amp; Reflection</i>	Engage students as active participants in the program
		Promote learning from mistakes through experience
		Integrate reflection as a pedagogical and assessment tool to help students internalize learning
	<b>Engineering Learning Outcomes</b>	<i>Collaborative Engineering problem-solving</i>
Identify and scope authentic problems collaboratively with the community		
Collaboratively draft and understand the criteria and constraints surrounding the problem		
Build on the existing assets (Physical, cultural, locational, human, institutional) in solving the problem		
<i>Collaborative Design</i>		Integrate evidence-based design approaches
		Utilize and teach systematic, informing decision-making through analysis of data and facts as well as social and ethical factors
<i>Appreciation of the discipline</i>		Allow students to understand and appreciate the discipline of engineering through experiential learning
		Prompt reflections to critically evaluate and understand the role of engineering in society
<i>Impact of design choices</i>		Educate students on micro and macro ethics of engineering in the world
		Provide various ethicalscenario'ss for students to understand design choices and their impact
		Prompt reflections to critically evaluate and understand the impact of decision-making and appropriate design choices in the society
<b>Faculty Engagement &amp; Assessment</b>		<i>Knowledge, Skills, and Attitudes on CBEL</i>
	Collaborate and work with members of the community to develop the required KSA on the assets and needs of community	
	Undertake learning through internal and external workshops (e.g., KGR CET UBA workshops, Palle Srujana, Participatory Research in Asia online courses and workshops)	
	Visit, connect, and benchmark with model institutions implementing community-based programs (e.g., HITAM EPICS, MGNCRE)	
	Learning through experience - Build KSA through implementing programs, reflections, mentoring new faculty, and orienting students and community	
	<i>Research informed practice</i>	Describe assumptions that are inherent to practice, community, and domain
		Identify prior research (searching for patents, journal articles from high impact factor journals)
		Conduct literature review of relevant knowledge fields
		Stay up-to-date on market innovations, technology innovations, and industry innovations
		Identify evidence-based findings to integrate into practice
	<i>Research-oriented</i>	Seek guidance and mentorship from academic experts in CBL and UBA programs involving research tasks
		Form a team/Community of Practice amongst the interdisciplinary faculty to conduct research

		Participate in Hackathons, research workshops, and trainings	
		Disseminate research via conferences, journal publications, and expositions	
	<i>Community Engagement in performance assessment</i>		Indicators based on monitoring and evaluation activities, ethical practices, and report developments
			Record teamwork performance through teamwork assessment strategies (performance scores, peer assessments, etc.,)
			Indicator based on funding's brought in for the university, awards, media mentions, and other accolades
			Patent relevant innovations
			Indicator based on number of dissemination activities achieved (publications, posters, papers, presentations, etc.,)
			Consider the number of projects lead and advised by a faculty
	<i>Multidisciplinary</i>		Engage with faculty and students from other disciplines based on problem focus areas