**Desirable and Effective Leadership Qualities in Engineering Education in India**

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***Abstract-*India needs more effective leadership in all types of engineering colleges, state technical universities, and deemed universities but many Tier I, Tier II, and III colleges suffer from a lack of appropriate leaders. Many tier III colleges have been closed for want of candidates or faculty members which reflects on the leadership. The leaders, viz, deans, directors, principals, and vice chancellors have to develop a strategic plan, nurture the faculty, and develop needed infrastructure in consultation with the Board of Governors. Most of the well-developed universities and institutes of national importance have shown the way. A research project has been undertaken through a naturalistic evaluation model. 338 fully qualified middle-level and entry-level faculty members have participated in the research. Four development themes have been selected to improve leadership: 1. Improving the development of the institutions through dedicated leadership, 2. Overcoming the omissions, 3. Improving the high performance of the motivated faculty teams, and 4. Improving the institutional policies. The success of the institutional development wholly depends on the super leadership and they have to be more confident in their planning, auditing, supporting, and mentoring of the faculty teams. Self-leadership is a must for faculty members. Such actions will alone make things happen.**

***Keywords*-Development themes, Leadership roles, omissions, nurturing, and institutional policies.**

1. **INTRODUCTION**

India is famous for leaders who developed the best methods of planning peaceful life, required products, educational institutions, and appropriate technologies. The Indian economy has attracted many foreign invaders who destroyed the culture, economy, peace, and educational institutions. In this twenty-first century, the competition for a disruptive technology-based economy has grown which demands many outstanding engineering institutions from certificate level to postdoctoral level. This is possible only when educational leadership grows in all types of institutions to create needed human capital and knowledge capital. The country ranks third in the world for developing needed graduates with cognitive skills, attitudes, and motivation. Since independence the growth of educational institutions are outstanding but the creation of intellectual properties is not up to expectation. Many national organizations, councils, commissions, and associations are focusing on upgrading science, technology, and research. The outcome-based curriculum has been introduced in all engineering programs but the leadership is very much lagging in the majority of the institutions.

**1.1 Current Scenario**

The majority of engineering institutions are not growing fast due to low priority on institutional growth and development. Leadership is not focusing on modernizing the curriculum or introducing cutting-edge programs at the bachelor’s, master’s and doctoral levels. Many outstanding faculty teams are not empowered and decentralization is lacking. A sizable number of institutions don’t attract needed students and are closed. Many institutes have not established consultancy centers and the faculty members are not empowered to bid for research and development projects under various government funding agencies and International Development Agencies (IDAs). The competitiveness of many Indian states is very low due to a severe shortage of human capital and knowledge capital.

**1.2 Desired Scenario**

Most tier I, II, and III institutions, state technical universities, and deemed universities are to be developed by highly motivated and dedicated leadership. They have to modernize resources and decentralize the administration. The faculty members are to be exposed to global programs in multidisciplinary research and technology development projects. The outcome-based curriculum has to be introduced in all branches. All these demands super leadership with a focus on strategic planning and faithful implementation. This will accelerate the growth of human capital and contribute to the needed knowledge capital. The growth of industries also depends on outstanding graduates with desired attributes. Their expertise will be needed for product analysis, design of prototypes, testing them, refining them, choosing the best manufacturing methods, marketing the products and maintenance. Ultimately, innovative products with maintenance-free long life, pollution within the prescribed limits and minimum power consumption will alone succeed.

1. **RESEARCH OBJECTIVES**

The following three objectives have been chosen for this research:

* To assess the current problems faced by the faculty members in establishing outcome-based engineering education
* To critically review the current scenario of leadership in many low-performing tier I, tier II, and tear III institutions by getting feedback from qualified and competent entry-level and middle-level faculty members.
* To suggest various remedial measures to bring rapid improvements in the performance of the faculty members by introducing the needed academic ecosystem.
1. **LITERATURE SURVEY**

Many researchers have identified the factors that affect institutional growth [ 1 to 35]. Most global universities focus on the appropriate leadership and well-developed academic ecosystem for facilitating the growth and development of outstanding outcomes. Institutional development is primarily dependent on the quality of leadership, resources, counseling, coaching, and mentoring of the faculty members, establishing needed ecosystems for rapid growth. Most of these institutes show the direction for such growth. Their panned approaches are presented in the following Table-1.

**Table-1: Desirable Leadership Qualities as Synthesized from the Literature**

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| **S. No.** | **Desirable Leadership Qualities** |
| 1. | Adept at handling heated and challenging issues with empathy, patience, and listening capacity. |
| 2. | Qualities needed for academic leadership: Proactivity (ability to recognize which tasks are the most essential, and create a prioritized list of what needs to be completed first) [8].Understand the needed balance in running a learning institution [9].To keep good teachers, leaders make them stay [10].Ensures a vision for the future with perseverance and keeps everybody invested in the process  |
| 3. | Qualities of successful school leaders: Integrity, building community effective school leaders [11].Cultivate mutual trust, loyalty, and respect among team members [13].A visionary leader does not hold back to take risks [14].Inspire their team by giving examples and making an effort to understand what employees are going through.Make and implement a plan to facilitate a fun and informative team-building exercise within the classroom [15].  |
| 4.  | Self-awarenessAbility to convey the vision to the faculty members and get them excited about it [16]. |
| 5. | Effective leadership in higher education: Passion for the work they do, setting goals, and helping teachers or students improve their performance [17]. |
| 6. | Confidence in leading an institution, faculty, staff, and students [18]. |
| 7.  | Awareness of what they need to work on to be the best leader possible. Building relationships with faculty members [19].A leader can understand the needed balance in running a learning institution.Management skills are thus vital leadership qualities. |
| 8. | Personality traits: making a change in the way things work. Improving education [20]. |
| 9.  | Effective collaboration, including faculty members in decision-making, and confiding in faculty for ideas, suggestions, and support [18]. |
| 10. | Good listener [19].Through strong listening skills, faculty members can create a stronger, healthier, and high-quality learning environment [21].Have a friendly attitude.Communicate decisively.Be a confident decision maker.Grab opportunities and earn the respect of your project team [22]. |
| 11. | Motivational qualities: Intrinsic motivation, ability to set goals, effective teaching style [23].Motivated members make for a stronger team [24]. Great leaders want to get to the truth and questions are the best way to get there. An inquisitive leader is motivating to the team, who can be confident that their path has been well planned [25]. Great leaders motivate and inspire their faculty members not only to do great work but also to get them to do things they may not want to do [28].Trait theory is explained as people who have inherited leadership characteristics [27]. |
| 12. | Self-motivated leaders [29].Receptive to and actively encourage innovation. Motivate and inspire their faculty members to come up with novel ideas [30].They are honest. Patient, a strategic mind, change management skills, and a positive attitude are all examples of resilience that help institutional leaders guide their teams through stormy leaders [31]. |
| 13. | Excellent emotional intelligence [32].Emotional intelligence makes a person empathetic and a good listener. |
| 14. | Empower team members with the authority to do something with complete control.No micromanagement [33].  |
| 15. | Set several smaller goals as opposed to one large one, to make evaluating your progress and the process easier. Remain open to both feedback and criticism [34].The goal is to pick some personal qualities to cultivate over time. You can gain confidence if you work at it.Using your reflections is an effective way to learn what motivates you to do your best work. Be passionate about working with older and less able members [35]. |
| 16. | Macro Managers: Educational administrators should not control high-performing faculty teams’ professional work. Should not obsess over the tiny details of a project. Have the mindset that the whole enterprise would grow without them. Encourage initiative or creative thinking in a team. Never believe thinking is one way. Have a concept of office hours. Should not tend to overreact, especially to minor setbacks. Never interfere with faculty’s work and be overly critical. Have an unwavering belief in a ‘bottom up’ management approach [36]. |

**3.1 Synthesis of the Literature on the desired qualities of educational leaders**

* Capable of handling challenging issues with empathy and patience
* Strategic planning, periodical academic audit, creating centers of excellence, listening and collecting feedback
* Proactivity and balance in running a higher education institution
* Vision for the future with perseverance
* Keep everybody invested in the development process, mentoring the faculty teams
* Recruit and retain well-accomplished, and achievement-oriented faculty members
* Passion for the work they do, intrinsic motivation, emotional intelligence, and rewarding the best performers
* Cultivate diversity and innovation
* Integrity, equity, ethics, development culture, decentralization, and empowerment of the high-performing faculty teams
* Focus on macro jobs

**4.0 RESEARCH METHODOLOGY**

Naturalistic evaluation as suggested by Guba and Silverman will be used to assess the drawbacks through a set of questions administered on the purposeful sample. The feedback will be analyzed and an appropriate development process will be identified in empowering the faculty to plan needed outcome-based curricula, undertake interdisciplinary research and development programs, offering consultancy services to various engineering companies and government departments. These are based on improving the attributes of the graduates and developing the faculty members.

**4.1 Population**

For this research work, middle-level faculty members like senior assistant professors, associate professors, and newly recruited professors working in affiliated, government, state technical universities, and deemed universities in the southern region have been considered. All of them are having Ph.D. degrees in their branches of specialization, undergone many faculty development programs in content updating, advances in the state of the art of technologies, and industrial exposure. All of them are aiming to reach top leadership positions in engineering colleges or universities.

**4.3 Sample**

338 entry-level and middle-level faculty members from affiliated, self-financing, & government colleges, deemed universities, and state universities have been sampled for this research. Most of them will have ample opportunities to reach the principal/dean/director level. 38% of them plan to complete their Ph.D. within one year and 62% of them are having Ph.D. in their field of specialization. Most of them have undergone at least five faculty development programs that are offered by various organizations and the World Bank-assisted projects in quality improvement, AICTE, and/or Human Resource Development Centers, or in-house faculty development programs. Only 7.1% of them underwent one week course on higher education administration, performance evaluation, institutional change and development, organizational behavior, academic auditing, and desired intervention.

**4.4 Research Questions**

* Whether the leaders have communicated the planned institutional development in the next five years?
* What are the visible omissions in planning by the educational leaders of engineering institutions?
* What are the visible constraints in majority of engineering institutions to high-performing faculty teams due to restrictions imposed by the leaders?
* What are the significant drawbacks in institutional policies and enabling resources due to leaders’ perception of institutional planning?

**4.5 Significant Feedback from the 1138 Entry-Level and Middle-Level Participants:**

**Table-2. The following are the significant planning issues that are discussed by the educational leaders:**

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| **Discussions on the Institutional Growth** | **Impact** | **Suggested Remedial Measures** |
| Limited Confidence in the Institutional Growth | This shows that the leaders are not exposed to the fast growth of engineering programs to meet the needs of the industries. | There is an urgent need for developing the confidence of educational leaders like chairpersons, directors, deans, and principals in planned change and institutional growth. |
| Limited Confidence in the Strategic Planning | The leaders have not yet attempted to introduce strategic planning. They have yet to create a vision and mission for the institution. | The leaders have to be involved in strategic planning and its impact on human resource development, modern resources, industry-specific curricula, and active participation of the companies in training both the faculty members and graduates. |
| Limited Confidence in the Performance of the Faculty Members | Most institutions have only 40-50% of the faculty positions filled. They are not able to attract highly qualified and accomplished faculty members. | There is a need for pre-service, in-service, and lifelong learning for the faculty members. The institutes have to create funds for training. They can fully utilize the avenues made by the government.  |
| Limited Confidence in the Attributes of the Graduates | Since the candidates choose excellent institutions, many institutions that are located in remote places are not attracting them. | Graduates need counseling, coaching, and mentoring. They need more exposure to the state of the arts in planning, design, testing, prototype development, manufacturing, and maintenance. |
| Limited Confidence in the Growth of the Economy. | Industrial growth is not the same in all districts. Many well-planned corridors and hubs attract new companies based on the resources, uninterrupted power supply, multimodal transport networks, ancillary component suppliers, human resources, and nearness to ports. | The leaders have to be exposed to the global competition in upgrading the technology, meeting various digital technology disruptions, and the success stories of many countries which globalized their economies and collaborated in developing outcome-based economies. |

These are the bottlenecks that obstruct the growth of industry-relevant human resources. Hence, the primary focus should be on changing the perception of the leaders of the institutions.

**Table- 3. The following are the omissions in planning by the educational leaders:**

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| **Visible Omissions** | **Impact** | **Suggested Remedial Measures** |
| Lack of Perspective Plan. |  The Long-term growth of the institutions is affected. | The Leaders, faculty members, and students are to be trained to create a perspective plan based on industrial needs. |
| Lack of Strategic Plan. | The growth of the students is affected. | It is important to prepare a strategic plan and all the stakeholders are to be involved. The developed strategic plan has to be reviewed every year against the fast-growing needs of the region. |
| Lack of periodical academic audit to evaluate the performance and shortcomings, and take remedial measures. | The mismatch and curriculum continued without improvement. | The faculty members are to be introduced to the annual academic audit. The tracer study has to be undertaken to get feedback from the alumni and their employers. The faculty members need to be assessed on the difficulties faced by them in planning and conducting industry-relevant and outcome-based courses. |
| Lack of delegation and decentralization. | The growth of the departments is affected. | Many universities have achieved excellent growth by following delegation and decentralization. Case studies can be developed and courses on decentralization and delegation should be introduced. |
| Lack of grievance and remedial measures. | The faculty members continued to suffer without resolving the problems. | Many faculty members have grievances on pay scale fixation, leave grants to undergo higher studies, approval for presenting the research papers, reimbursement of expenditure incurred on the paper presentation, etc. All these grievances are to be solved as per the norms, rules, and standards. |
| Lack of conflict resolution measures. | Many departments couldn’t resolve the conflicts in resource allocation. | Many departments have to maintain their equipment and instruments, and purchase additional software, consumables, etc. Many conflicts occur due to some irregularities. All these conflicts are to be resolved in the best interest of the institute faculty and graduates. |

**Table-4. The following are the significant drawbacks/constraints in a significant number of institutions to high-performing faculty team members due to restrictions imposed by the leaders:**

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| **Constraints** | **Impact** | **Suggested Remedial Measures** |
| Discrimination of the well- performing faculty teams (WPFT). | Many outstanding faculty members left the institute for overseas jobs. | The institute has to follow the recruitment rules, award project grants, sanction study leave, etc. |
| Lack of recognition of the high-performing faculty teams. | Many lost achievement motivations and didn’t take interest in planning and development research works. | Recognition liking advance increments, sharing the project gains, sanction higher academic grades, dean posts, etc. are to be based on the ethics, norms, standards, and rules. |
| Lack of rewards for generating internal revenues from global projects. | High-performing faculty leaders stopped bidding for international projects. | Many leaders don’t follow the norms and standards. This leads to court cases. Even after the court judgments, the amounts are not dispersed. The leaders have to follow the ethics and rules without any plausible discretions. |
| Lack of approval for undergoing the needed training and development programs under global institutes. | Many couldn’t enroll in the cutting-edge programs for want of nomination even though the application was routed through the institute. | Many leaders assume that the well-performing faculty members may not get selected but they are surprised when the faculty have been selected based on their accomplishments. Leaders should follow the rules diligently.  |
| Lack of approval for bidding for development projects under international development agencies. | The letters of invitation were not circulated to the faculty members which caused of the stopping the planning. | Many leaders don’t forward the bid documents to the project authorities due to low confidence in the abilities of the faculty teams. The leaders have to follow the norms but not their discretions. |
| Lack of approval for establishing interdisciplinary research programs. | The academic leadership of the institute was lost. The graduates lost substantial attributes. | When the industries look for industry-ready graduates, interdisciplinary research programs have become a must. A culture of planning interdisciplinary postgraduate and doctoral programs is essential. |
| Lack of supportive culture. | Many projects suffered due to the late submission of project proposals and reports. | The leaders have to support viable/ outstanding projects based on quality, and in-depth proposals based on the terms and conditions. |
| Lack of confidence in the project faculty in developing solutions for external organizations and companies | Many outstanding faculty members have stopped bidding for the complex projects under IDAs. | Delegate needed administrative authority if preparing technical and financial proposals based on the terms of reference. Don’t micromanagement. Empower the teams. |

**Table-5. The following are the significant drawbacks in institutional policies and enabling resources that are due to leaders’ perception of institutional planning**

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| --- | --- | --- |
| **Drawbacks** | **Impact** | **Suggested Remedial Measures** |
| Lack of resources, funds, improper implementation, and inappropriate learning environments. | Improper planning destroyed the advances of human capital and knowledge capital. | The leaders have to become a part and parcel of the teams. A good learning environment has to be created for enabling development. |
| Lack of consultancy center | The whole institute suffered due to ad hoc arrangements. | A consultancy center is very much required to prepare needed projects and hence a consultancy project is to be established with an outstanding head. |
| Lack of in-house faculty development center. | Many faculty members couldn’t grow in their areas of performance. | An in-house faculty development center is a must and it should be established to offer needed development programs. |

**4.6 Discussion**

World most international universities are vigorously focused on leadership qualities to develop high-performing faculty members, contributing to the human capital and knowledge capital. If the leaders are not committed to the planning of needed resources, enabling high-performing faculty teams, there will be more disastrous. The planners have to ensure the selection, training, and providing needed funds for institutional growth.

**4.6.1 Suggested Methodology for Improving the Prevailing Leadership Qualities**

The following four interventions are identified: 1. Improving the confidence of the leadership of the engineering institutions since the development of the performance of the faculty is to be enabled by the leaders. 2. Overcoming the omissions in the planning and implementation of various graduate and postgraduate programs. 3. Reducing the constraints and improving the performance of the dedicated faculty members is one of the focused activities. 4. Further, removing the drawbacks in planning and implementing needed systems will improve the attributes of the graduates.

**4.6.2 Impact on Engineering Institutions**

These suggested methodologies have been disseminated to 129 affiliated colleges, 11 autonomous colleges, 5 deemed universities, and 3 state universities in the Southern Region as a part of validation. The institutes under the World Bank assisted project for improving the quality have started implementing the suggestions over five to ten years and improved their performances. Deemed universities have improved their performances due to the vigorous implementation of the suggestions. The heads of departments have been motivated to plan and offer innovative programs, consultancy projects, placement of students in various companies in the industrial hubs, and undertook industry-specific projects. They also focused on faculty development in consultancy works, interdisciplinary research, and training the employees under various projects. All these are due to the commitment of the present leaders with the active support of the chairman of the governing council. Further, these institutions are having well-trained leaders who dedicate their skills to developing centers of excellence. They consistently focus on the key performing skills of the faculty members like implementing industry-specific curricula, undertaking consultancy works, and organizing interdisciplinary research works. An academic ecosystem has been created for continuous development.

**5. ULTIMATE LEADERSHIP MODEL**

Leadership is an activity-an influence process in which a faculty member gains the trust and commitment of other team members without recourse to the formal position. The following subcomponents are presented which constitute the ultimate leadership model:

* Behaviors that Encourage the Faculty Members
* Skills of Encouragement
* Leadership by Encouragement
* Self-Leadership-Behavioral Strategies to Influence Ourselves
* Role of Leaders in Bringing Creativity and Innovations to the Institutions
* Leader Behavior for Self-Managing Teams
* Super Leadership

5.1 **Leadership by Encouragement [38]**: Encouragement is a process that focuses on the faculty members’ resources and potential to enhance self-esteem and self-acceptance. Encouragement is the act of inspiring faculty teams with renewed courage renewed spirit or renewed hope. During difficult times faculty members need renewed courage, a renewed spirit, and renewed hope- that is encouragement. Faculty members always expect encouragement for all their accomplishments, achievements, and contributions to knowledge capital and human capital. They never accept discouragement for initiatives and risks taken them. They are ready to discuss their planned methodology and willing to modify the methods if required.

5.2 **Skills of Encouragement [38]:** Encouragement is the process of facilitating the development of faculty’s inner resources and courage toward positive movement. Encouraging leaders produce encouraged faculty members that lead to appreciating clients, students, graduates, alumni, and participants. Encouraging leaders have to focus on the faculty members, resources, and potential to enhance self-esteem. Leaders should effectively listen, focus on positives, cooperative, use humor and hope, and recognize effort and improvement.

5.**3 Self-Leadership-Behavioral Strategies to Influence Ourselves [42]:** Self-leadership is an extensive set of strategies focused on the behaviors and thoughts that faculty use to influence themselves. Spend a great deal of time listening to faculty members. Have a positive, optimistic attitude about the work and faculty members. Make a conscious effort to pinpoint the things that faculty members do right instead of their mistakes. Self-leadership makes faculty more efficient, motivated, and accountable, builds stronger relationships with team members, and inspires them to follow your lead. Skills for self-leadership are self-awareness, intrinsic motivation, decision-making, influence, empathy, and social skills. Strategies for successful self-leadership are building your self-esteem through natural rewards, and using environmental cues to encourage constructive behaviors and constructive thought patterns to your cognition.

**5.3.1 Strategies that can Translate into Organization-Wide Leadership Success [37]:** Be clear about your values. The way you lead is reflected in the relationship you have with colleagues. Change your mindset. Goals are fluid and evolving, just like our daily lives. Establish a common leadership language. No leadership development plan is instant-all plans require some consistency. Plan your performance. Be proactive. Show genuine interest in faculty members and have a good understanding of each person’s long-term goals. Be open-minded towards faculty member’s ideas. Solicit new ideas from faculty member’s project proposals. Treat every faculty member equally. Confront discouraged unproductive faculty in private, but not in public. Develop an ability to see hidden abilities, cognitive strengths, and psychomotor skills in your faculty members. Focus on cooperation, rather than competition to build team power. Give recognition for effort and improvement instead of only the finished task. Publicly appreciate the projects completed. Never take the reward for yourself.

**5**.**4 Role of Leaders in Bringing Creativity and Innovations to the Institutions [39]**: Innovative leaders have to steer the institutional activities and guide the faculty towards planning and achieve vision and mission. Innovative leaders are to be passionate leaders and they should chop through bureaucratic icebergs and courageously chart a new course. Innovative leaders should have a mission, create a vision, and trust faculty members. They should encourage risk-taking. They should remove barriers and obstacles, restrictive rules and regulations. Leadership has to be learned and should not the faculty as expendable resources to incur a great loss. An innovation-oriented leader should understand how, why, and what motivates faculty at work. They should remove the causes of failure and help to do a better job with less effort. Ensure that the path toward the goal is clearly understood by the faculty members. Reduce barriers to the achievement of the goal, and increase the number of personal payoffs to the outstanding contribution for attaining the project goals.

5.**5 Leader Behavior for Self-Managing Teams [42]**: The faculty members should evaluate their accomplishments periodically. They can plan various development courses based on their vision. Self-directed learning will enable them to choose various micro-credential courses. They have to plan to develop many interdisciplinary programs which help them to develop knowledge capital. They have to acquire the needed skills for developing technical and financial bids to undertake complex development programs under various International Development Agencies (IDAs). Further, they have to focus on disruptive technologies. They have to develop portfolios for various global competitions in their areas of specialization.

**5.6 Super Leadership [40,41]:** High levels of intrinsic motivation leads to super leadership behavior among the CEOs/Administrators. High levels of self-determination, self-efficiency levels, and high levels of self-regulation levels lead to super leadership behavior. Super leaders should delegate the required authority to decide on the spot/site. Proper management involves caring for faculty not manipulating them.

**6. CONCLUSIONS**

It is concluded that the full authority to develop high-performing engineering institutes is in the hands of leadership. The chairman, members of the Governing Council, and Leaders like Principals, Deans, Directors, and Heads of Departments. Hence, leadership development is the most essential factor for the growth of engineering institutes at all levels. Once, this is ensured, enabling policies, resources, and mentoring of the faculty members will lead to many outstanding interdisciplinary programs that will provide human capital and knowledge capital. One has to conduct a periodical academic audit and create an academic ecosystem for the growth of human resources in engineering and technology. The administrative officers should not focus on micromanagement. Super leadership will facilitate the growth of the faculty members who should also develop self- leadership.

**5.1 Suggestions for Further Research**: Many significant factors impact the growth of human capital like the culture of the state, the culture of the educational institutions, funds available, freedom to establish interdisciplinary programs, the growth of the economy, and the culture of cooperation and collaboration with various agencies. Hence, further research has to be undertaken to develop appropriate successful models in engineering education and institutional development. Further, the developed models have to be validated in different institutional and state cultures.

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