

Supporting Teaching and Learning in Engineering Disciplines in an Evolving Leadership Role

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Abstract

In this paper, the author discusses some of the best teaching practices for engineering faculty in leadership roles, that stimulate, enhance, and retain the focus on improving teaching and learning at a research university. Some strategies are discussed for effective engineering education for academics in leadership roles. A survey of academic leaders in the college of engineering at an emerging research university is conducted to inquire about effective teaching methodologies. The results of the survey are discussed. Suggestions are provided for academic leaders and administrators to maintain high quality teaching. Similarly, some of the pitfalls to avoid as an engineering professor are highlighted. The best practices that leaders could bring to classroom or laboratory teaching are examined.

Keywords

Academic Leader, Leadership, Teaching, Engineering Education, Administrator.

Introduction

At the research universities, as external funding is received and faculty get more involved in high quality research, the focus often tends to shift from high quality teaching and implementation of best practices in classrooms to spending more energy, time, and resources towards research. Similarly, academic administrators often tend to spend less time focusing on high quality teaching and more time on day-to-day administrative responsibilities. In this paper, the author highlights some of the best practices that senior faculty members, academic leaders, and administrators can adopt to continue the same level of rigor and high-quality teaching. A survey of engineering educators in leadership roles is conducted to determine the best practices, tips, and recommendations for increasing the quality of teaching. The results of the survey are discussed.

Literature Review

Higher education, just like any other organization, requires leaders. The most suitable leaders in higher education tend to be the academics that come up the ranks. Most of these leaders have backgrounds in research and teaching. Betof [1] argues that leaders as teachers help stimulate learning and development, strengthens the organizational structure and communications, promotes positive changes, and reduces costs by leveraging top talent. Bowan [2] asserts that leadership is a key element in meeting the needs of the engineering profession in an era of heightened global competition. Urbanski et al [3] present the reflections on teachers as leaders and discuss how the teachers now assert their own version of leadership – one that differs from administrative or managerial versions. As leadership responsibilities increase, there is a risk of teaching and research becoming secondary in importance. Siddique et. al. discuss the impact of

academic leadership on faculty motivation and organizational effectiveness in higher education [4]. They present a model that links leadership, motivation, and organizational effectiveness and suggest that their model could be useful for policy makers and management in higher education. Sathye [5] asserts that academic leaders need to stay close to teaching, learning, research, and scholarship to bring out the best among academics. Marilyn [6] compares effective leadership to learner-centered education rather to teacher-centered orientation, which might be equated to the top-down, autocratic, functionalist views of leadership. She asserts that any changes made by leadership must link to the present and past of the organization, just like new knowledge must connect to what the organization has adopted to be fully understood, embraced, and sustained. Evolving leaders should use specific strategies to keep their skills sharpened as effective educators.

Strategies for Academic Leaders as Effective Engineering Educators

Academic leaders, such as college deans, assistant and associate deans, and department chairs, assistant and associate department chairs, and program directors etc., play a crucial role in shaping the educational environment and ensuring the success of both engineering educators and students. Following are some of the strategies that academic leaders should utilize to remain effective educators while fulfilling their leadership roles:

1. Continuous Professional Development:

Successful academic leaders must stay updated with the changes in academia. They should make concerted efforts to keep abreast of the latest educational trends, teaching methods, and technologies. This could be achieved in several ways including attending workshops, conferences, and seminars including but not limited to the American Society of Engineering Education (ASEE) conferences and workshops, Scholarship of Teaching and Learning (SoTL) conferences, and other professional society events and pedagogy related activities. Effective academic leaders also should lead by example. They should demonstrate a commitment to lifelong learning to inspire educators under their leadership.

2. Supportive Environment:

Effective leaders need to foster a positive culture. They should create a positive, supportive, and inclusive department, school, or college culture where engineering educators are motivated to excel. They must emphasize work-life balance. Leaders' ought to encourage a healthy work-life balance among educators to prevent burnout and enhance their teaching effectiveness. Effective communication is an important support that a leader could provide. Transparent communication begins with the leader. A good leader maintains open and honest communication with educators, students, and parents. Transparency builds trust and collaboration. An important aspect of communication is active listening. A leader fosters effective teaching by listening to concerns, feedback, and ideas from educators. They have a duty to act on valid concerns and involve teachers in decision-making processes.

Successful leaders should encourage innovation. They must support innovative teaching methods and projects. They ought to allow educators the freedom to experiment with new approaches. They need to seek professional development opportunities for faculty and staff. They have a duty

to provide opportunities for educators to enhance their skills, such as mentoring programs or funding for further education.

3. Student-Centered Approach:

Effective academic leaders must focus on student success. They should keep student learning and well-being at the center of all decisions. They should encourage practices that support student engagement and academic achievement. They must also encourage and support educators in tailoring their instruction to meet the diverse needs of students.

Productive leaders need to utilize data. They often use student performance data and other relevant metrics to make informed decisions. This helps them to identify areas that need improvement and develop strategies accordingly. Similar strategy can be applied for performance evaluations. Leaders should implement fair and constructive professor evaluation processes based on multiple measures, including classroom observations and student outcomes.

4. Collaborative and Ethical Leadership:

Teamwork is essential to foster collaboration among educators and other staff members. Encourage teamwork, interdisciplinary projects, and a sense of community. Effective leaders also have a sense of shared vision. They must help develop and grow a shared vision for the institution with input from all stakeholders. They ought to empower faculty to ensure everyone understands and works toward common goals. Effective leaders also must adapt to change. They need to embrace change and guide educators through transitions, whether they involve curriculum updates or shifts in educational policies. They must develop problem-solving skills and resilience to effectively handle challenges and setbacks.

Practicing ethics is of paramount importance in higher education. Academic leaders have a duty to model ethical behavior. They need to demonstrate integrity, fairness, and ethical behavior in all interactions. They should set a strong example for educators to follow. They must promote diversity and inclusion and create an inclusive environment where diversity is celebrated, and all individuals are treated with respect and fairness.

5. Self-Reflection:

Continuous self-reflection is critical for success for an academic leader. Effective leaders need to regularly reflect on their leadership style and effectiveness. The key is to be open to feedback and continuously strive for improvement. Evolving leaders should also seek mentorship. They should engage with experienced academic leaders or mentors who can provide guidance and support.

By combining these strategies, academic leaders can effectively balance their administrative responsibilities while remaining dedicated educators committed to the success and growth of both their staff and students.

Survey

A survey of engineering academic leaders was conducted at an evolving research university. The respondents were asked to answer the following questions in relation to maintaining high-quality teaching while serving as the leaders for the college of engineering.

1. In a leadership role, what are your suggestions for academic leaders and administrators to maintain high quality teaching?
2. As a leader at an educational institution, what are some of the pitfalls to avoid as an engineering professor?
3. What are some of the best practices that leaders could bring to classroom or laboratory teaching?

For this work, 10 academic leaders were asked to complete a survey to gather recommendations for best practices in teaching engineering courses. These leaders include the dean, assistant and associate deans and department chairs at a comprehensive engineering university in the south-eastern United States. The results of the survey are as follows:

1. In a leadership role, what are your suggestions for academic leaders and administrators to maintain high quality teaching?

One participant responded:

“...most importantly, keep teaching. Some administrators simply stop teaching.”

This respondent highlighted an important point that administrators often overlook. As the administrative responsibilities increase, the leaders often stop teaching. This could lead to them becoming disconnected from classroom and student needs. By staying current in teaching, the administrators could not only become effective teachers but also sharpen their leadership skills. Keeping the teaching skills sharpened is a lifelong endeavor. Another administrator suggested:

“[It is] good to attend education conferences now and then, like ASEE. You can keep up to date with the latest thinking.”

Another responded:

“Learn about effective teaching strategies that allow saving time while maintaining the quality.”

Another participant said:

“Start the planning of the course early before the semester starts”

Leveraging the expertise of others, including industry professionals could enhance the value of the course. One respondent said:

2024 ASEE Southeastern Section Conference

“Utilize other instructors and invite them as guest lecturer.”

Some respondents added additional suggestions from their perspectives as leaders, that other administrators could utilize. One commented:

“[Administrators] can/should follow up with faculty from time to time about the classes, encourage peer observations, promote the lead-professor model, direct faculty to teaching effectiveness resources, review the grade distributions, review faculty teaching evaluations one-on-one, and provide feedback.”

Another respondent suggested:

“Encourage faculty to stay current in their field by attending conferences, trade shows, etc. Encourage faculty to work outside the university during summers; industry experience is paramount to good teaching. Ensure faculty talk about themselves and their career path, not just the subject matter.”

It is evident that personal experiences and stories tend to make lectures engaging. If faculty are encouraged to gain outside experiences, they will have a greater likelihood of engaging students and thus becoming effective educators and leaders. Another respondent suggested:

“Provide more resources and support to maintain high quality teaching.”

Another participant had suggestions for academic leaders in the context of maintaining high quality teaching:

“Hire dedicated instructors with relevant degrees. Yes, major is relevant and so is experience. Instructors out of discipline can cause more damage than good. Assign fundamental courses to the senior/experience faculty as too much is built on the students grasping the fundamentals. No shame to ask faculty to attend teaching workshops, what worked 10 years ago might not be useful these days.”

All these suggestions from academic leaders reinforce that leaders need to continue to engage in teaching to remain relevant and effective.

2. As a leader at an educational institution, what are some of the pitfalls to avoid as an engineering professor?

The following responses were received for the above question. One responder suggested:

“Avoid failing to communicate clearly with students, colleagues, and staff, as effective communication is essential for collaboration and understanding.”

Another leader recommended:

“Steer clear of teaching outdated or irrelevant material; keep your curriculum up to date to reflect industry trends.”

Staying current and relevant is possible if the educator is vested in student success through effective teaching. Student feedback is important. When taken strategically, it can help improve the performance of the leader and the educator. One participant commented:

“Don't dismiss student feedback; use it to adapt and improve your teaching methods.”

Balancing administrative work with other activities, especially teaching, could help improve the outcome of the leader both as a mentor and an educator. As one participant responded:

“Don't let the administrative job fill your entire brain space. Set time aside to think about your course, and how to improve it.”

One respondent had great feedback on the pitfalls to avoid for professors in general but leaders and educators in particular:

“Putting priorities and conveniences of the faculty member ahead of students, thinking of administrators as a different species, not adopting or being open to change, being out of touch with industry, lacking sense of belonging/community, not coming to the office physically, thinking that Friday is an off-duty day.”

Another leader suggested:

“Don't teach from PowerPoint slides; use as a supplement. Don't just read notes. "Death by PowerPoint" is a real issue. You'll lose students in no time reading from a bunch of slides in an hour. Do examples. Don't just do textbook examples. Give real life examples from your own experience; the textbook will always be there with textbook examples.”

If too many responsibilities are taken on, then that could result in reduced performance. To mitigate that, one responder recommends:

“[avoid] Being overly ambitious for multiple roles. Rather stay balanced with reality within the capacity.”

Advice came from another respondent that is targeted towards student success:

“Do not assume that students know the needed background of a course. A 1–2-week review of relevant material goes a long way. Students who do not have or forgot the needed background from prerequisite will be confused throughout the course. Less topics but in depth better than covering entire textbook by skipping through pages.”

Along the same lines, another respondent suggested reviewing work for students during lectures:

“Some students are shy to ask for help, so don't assume if no one raises their hand they know what you throw at them. One-on-one 30 minutes review with some students are tremendously helping.”

As academic leaders and engineering educators, it is important to keep student success in mind in both roles.

3. What are some of the best practices that leaders could bring to classroom or laboratory teaching?

For best practices, the respondents encouraged staying current and connected with the latest developments in the field of study. One respondent suggested:

“Show genuine enthusiasm for the subject matter to inspire students' curiosity and interest.”

Another leader commented:

“Set clear learning goals and communicate them to students, ensuring they understand what is expected.”

Time management is a life skill. It often determines the success or failure of a leader. For effective time management, one respondent recommended:

“Manage class and lab time effectively to make the most of the available resources.”

A few other suggestions for leaders to bring to classroom included:

“When applicable, using hands-on methods and bringing physical models to the class, more in-person classes, interactive learning as against 'lecturing', having/utilizing more full-time faculty to reduce use of PT faculty, encouraging professional development opportunities, being sensitive to the students' needs while also being strict about deadlines etc.”

Time is usually limited in a semester and extra-curricular academic activities. But these activities often have the greatest impact on students. One respondent recommended:

“Take students on field trips to local industry that involves the topic of their course, program, or profession. If that's not feasible, bring industry folks to your classroom to present and do Q & A; always leave time for Q & A. Ensure the industry person describes their path to where they are.”

The leadership mindset carries to a classroom and reflects one's ability to inspire the next generation of leaders. A good academic leader should set high values and standards for students to aspire to. One leader argued:

“Leadership mindset in a group-based task; Excellence, wisdom and inclusiveness.”

Lastly, a fundamental quality of a leader is the willingness to listen. This quality translates well to a classroom. Listening and responding to student questions can open the room up for more discussions and flow of ideas. One respondent recommended:

“Listening attentively to the question, as sometimes students do not know how to ask or what to ask for to help them. Be prepared, shaky board work can be easily called out. Solve examples or run a sample test to remove the ‘confusion’.”

These ideas and suggestions, if remembered and practiced, can make an academic leader a successful educator and an efficient mentor.

Summary and Conclusions:

In this paper, some strategies for academic leaders for effective teaching are discussed. Literature is rife with effective teaching but often, when the engineering educators adopt leadership roles, teaching takes a backseat. Suggestions for academic leaders and administrators to maintain high quality teaching are presented and pitfalls to avoid are discussed. Engineering leaders’ responses to a survey are presented where they provide valuable suggestions and best practices that leaders could bring to classroom or laboratory teaching. Recommendations are presented for academic leaders to keep teaching effectively in the front view because that can lead to student success, better quality of graduates, improved leadership, and most importantly a better society.

Acknowledgements:

The author acknowledges and appreciates the survey responses from the academic leaders including the dean, associate dean, assistant deans, and department chairs.

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