Being Led and Leading in Science and Life: 
An Index of Mentor Quality

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Nothing that is worth knowing can be taught. [Oscar Wilde.]

Some people may be natural born leaders, but more commonly, leadership is a learned trait. Inferring from the wisdom (above) of the classic playwright Oscar Wilde, leadership cannot be taught by formal education—it must be lived. Many formal courses are offered, books have been published, and videos produced to enhance the set of skills required to be an effective leader, but their efficacy is questionable and outcomes may be variable.

How then is leadership learned if not through formal education? I believe that leadership is inherited, not necessarily by genetic transfer, but is passed on from established, experienced leaders to other individuals seeking those skills. With apologies to Wilde, leadership can indeed be taught, not most effectively by formal coursework, self-improvement classes, or commercial products, but through mentorship. Mentors teach leadership and other critical skills directly, by example and experience, and indirectly, by serving as role models (Lee et al. 2007). Mentorship is key to a successful career in science and an influential and rewarding life beyond one’s profession. In this vignette, I share my personal experiences in mentorship and integrate them into a tool that can be applied to help select a mentor, introspect on mentorship, evaluate others’ mentorship, and enhance leadership development.

Personal Experience with Mentorship

I was fortunate to be mentored by some excellent fisheries scientists who were leaders in the field and effective in mentorship. They were my mentors, teachers, colleagues, and friends. As an undergraduate student of ecology at University of Illinois, I stumbled into an hourly technical position at the Illinois Natural History Survey (INHS; the research arm of the state natural resource agency) to assist with fish and aquatic macroinvertebrate field sampling and laboratory sorting. That position led me to pursuing a master’s degree, funded by a research assistantship, followed by 5 years of employment as a research scientist. I completed many informative undergraduate and graduate courses at the university, but I learned to be a scientist at the INHS.

Early Training

My early training as a scientist in Illinois was provided through mentorship. Weldon “Larry” Larimore was my supervisor and advisor for much of my time at the INHS. I learned a

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tremendous amount by working with and watching Larry. He was the most knowledgeable naturalist I had met, and he was willing to share that knowledge, as well as his experience in fisheries. I learned from him that there was much more that we didn’t know about fisheries and aquatic ecology than we knew and understood—and this was powerful and fascinating to a student and young scientist. I spent many hours in the field, lab, office, and barroom pursuing all that knowledge waiting to be discovered.

Building on a Foundation

Tom Waters was my doctoral advisor at University of Minnesota and my second primary mentor. He was a Northwoods gentleman, an avid trout angler and woodcock hunter, as well as a leading stream ecologist. When I began my studies with Tom, I thought I was on good scientific footing from my 11 years at the INHS, but Tom quickly showed me the great gaps in my knowledge, skills, and understanding—and we worked together to expand my scientific abilities. Tom was the best writer I have known—author of multiple citation classic articles and books for scientists and the public—and I emulated his style as best I could.

Developing and Applying Skills

In my current position as leader and professor at the North Carolina (NC) Cooperative Fish and Wildlife Research Unit at NC State University, I interact with university colleagues, state and federal natural resource agency cooperators, and undergraduate and graduate students (Kwak and Margraf 2006). In this complex professional setting, I have been mentored by Rich Noble. In addition to success as a seasoned fishery scientist, Rich was my only mentor with administrative experience, as the coordinator of our Fisheries and Wildlife Sciences Program. In his position as professor and administrator, he had incredible insight into problem solving and reaching consensus. In my unit leader position, I relied on Rich’s counsel and learned some of his management skills over the years. As a result, I was able to build strong relationships with agency and university colleagues and students. That was crucial, as working with people is the most challenging component of our jobs.

Integrating Mentorship

These three mentors offered varying styles and different skill sets to share with me. All three were exceptionally successful in their own careers and as leaders and mentors, but I needed to develop my own path and approach. Their mentorship allowed me the ability to observe, learn, and adopt specific attributes of the way they conducted their lives that fit best with my goals and personality.

It is also important to be aware of pitfalls in leadership to avoid as we pursue a path to success. We have the opportunity to learn about leadership from everyone we meet. In addition to the three successful mentors in my life, I have observed examples of attempted mentorship that obstructed professional development, and this exposure can be very educational as well. In my personal development as a mentor, I have learned from my own experiences as to what is effective, as well as missteps.

I learned so much about leadership from others along the way, both in professional and personal settings. At each stage of education and employment, there were other
colleagues that provided mentorship in a peer-level setting. For me, Gary Warren, Tom Skelly, Mike Wiley, Ray Newman, and Greg Cope have served as mentors as supervisors and colleagues in various positions, and they had a strong impact while we worked closely together to achieve common goals. My colleagues in the NC Cooperative Research Unit, Jaime Collazo, Joe Hightower, and Ted Simons, taught me a great deal about leadership by interaction and example. Learning leadership from peers is a strong complement to being mentored by a superior. Overall, we seek to develop our own unique leadership style, and learning this from a team of mentors, over time or concurrently, is an optimal approach.

**Mentorship Quality**

Here, I integrate attributes and style of leaders that are effective mentors into an index of mentor quality (IMQ; Table 1). This index, modeled in a framework analogous to the

<table>
<thead>
<tr>
<th>Attribute category and metric</th>
<th>5 (highest quality)</th>
<th>3</th>
<th>1 (lowest quality)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Professional development</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional age</td>
<td>Well established and connected</td>
<td>New to the job, career-building</td>
<td></td>
</tr>
<tr>
<td>Experience and knowledge</td>
<td>Broad and deep</td>
<td>Narrow and shallow</td>
<td></td>
</tr>
<tr>
<td>Productivity and impact</td>
<td>High output with impact</td>
<td>Low and insignificant output</td>
<td></td>
</tr>
<tr>
<td>Institutional support</td>
<td>Strong with abundant resources</td>
<td>Weak with minimal resources</td>
<td></td>
</tr>
<tr>
<td><strong>Personal attributes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enthusiasm</td>
<td>Passionate and positive</td>
<td>Cold and negative</td>
<td></td>
</tr>
<tr>
<td>Sensitivity and respect</td>
<td>Understanding</td>
<td>Indifferent</td>
<td></td>
</tr>
<tr>
<td>Generosity</td>
<td>Gives freely</td>
<td>Guarded</td>
<td></td>
</tr>
<tr>
<td>Open-mindedness</td>
<td>Open to new approaches</td>
<td>Stagnant thinker</td>
<td></td>
</tr>
<tr>
<td><strong>Management style</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Availability</td>
<td>Open-door policy</td>
<td>Appointment only</td>
<td></td>
</tr>
<tr>
<td>Direction intensity</td>
<td>Balanced, as needed and welcomed</td>
<td>Micromanagement or sink-or-swim</td>
<td></td>
</tr>
<tr>
<td><strong>Total IMQ score (sum of 10 metrics)</strong></td>
<td>50</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td><strong>Mentorship class</strong></td>
<td>Excellent — Good — Fair — Poor — Very poor</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Recommendation</strong></td>
<td>Sign up</td>
<td>Keep looking</td>
<td></td>
</tr>
</tbody>
</table>
index of biotic integrity, developed by Jim Karr et al. (1986), includes 10 attribute metrics that influence mentorship within three broad categories of mentor quality. The metrics are scored individually and then summed to yield a total IMQ score of mentor quality that may be categorized from very poor to excellent. Some insight and rationale for the metrics are provided below.

**Professional Development**

A leader’s stage and depth of professional development can have important influences on their mentorship quality. Mentors that are well established and secure in their position and status at an advanced professional age are in a better situation to provide quality mentorship than one who is new to employment and focused on building his or her own career. It is a common flaw for scientists new to a position to consider their students or supervisees as a means to career advancement (i.e., focus is on the mentor, rather than the mentee). Scientists that themselves have been well mentored and have broad **experience and knowledge** and apply those traits to **high productivity and impact** are more likely to share their knowledge and method to achieve success. And those who have strong **institutional support** will have ample resources and opportunities to share with those they mentor.

**Personal Attributes**

Many attributes associated with an individual’s personality, conduct, and principles (i.e., their overall ethic and behavior toward others) affect mentorship ability. While much of a person’s nature or being is formed early in life, how that is expressed in the professional environment can be shaped and learned. There is much more to be learned from a mentor who has strong **enthusiasm, sensitivity, and respect** for others and practices **generosity and open-mindedness** than those with opposing traits. And further, being around people with these leadership qualities makes learning and our work more enjoyable and effortless. Observing the positive outcomes with positive personal attributes inspires others to emulate them in hopes of similar results.

**Management Style**

Two aspects of management style that indicate mentorship ability are **availability** and **direction intensity**. A mentor must be available to the mentee to be effective. Much of learning happens in casual, impromptu discussions, as well as planned meetings. There is an appropriate level of direction or management for each supervised individual, and the challenge for a supervisor is to match the intensity level with the need by the supervisee. Some require only broad supervision and direction, and others may need more intensive direction. But overall, a balanced intensity of management is optimal, and neither micromanagement nor a sink-or-swim strategy works as effective mentorship.

It would be a rare individual to score extremely high (50) or low (10) in a total IMQ, and most mentors fall in between as we all have our individual strengths and shortcomings. The IMQ categories and metrics, however, may be a useful tool for introspection, leadership development, and self-improvement, as well as for those assessing potential mentors for effective mentorship.
Parting Thoughts on Diversity in Mentorship

Of course, everyone has different personal needs and objectives, and so there can be no one single prescription for effective mentorship. We seek out the best mentors to assist us with our own goals. That search is critical as a major shaping force in the professional and person that we become. Mentors for a specific objective in your education and career often become mentors for life. And their style and attributes may become yours because we treat others as we have been treated. So rather than searching for a mentor that is much like you, it may be more advantageous to find a mentor that is a person that you would like to become. My three primary mentors were Caucasian men, and I certainly could have gained a more diverse perspective with more diversity among my mentors. We can strive to broaden our outlook by seeking diversity in those we mentor. Mentorship is not a one-way process, and we learn from those that we mentor. As such, selecting individuals that we mentor is an important decision.

Your leadership may not be guided by a single mentor—in fact, one’s leadership style is an integration of lessons learned and lived with a few key mentors, as well as those with whom we cross paths for brief experiences. Thus, there is no need to overthink mentorship, but it is worthy of a sense of awareness. It was my intention here to heighten that awareness with some ideas and thoughts based on my experiences to share with others to consider on our individual journeys through the scientific profession.

Acknowledgments

My three primary mentors shaped many of the ideas shared in this essay—Larry Larimore, Tom Waters, and Rich Noble. Larry and Tom are deceased, and their spirit is alive in me. Rich remains a trusted confidant and advisor, and it is my good fortune to call him my friend. In addition to professional mentors, my family of siblings, wife, children, and especially parents, Joe and Thecla, have been major influences in shaping me as a scientist and leader—and for them, I am grateful. This essay was improved from an earlier draft by comments and suggestions by Greg Cope, Gus Engman, and Bonnie Myers. The North Carolina Cooperative Fish and Wildlife Research Unit is jointly supported by North Carolina State University, the North Carolina Wildlife Resources Commission, the U.S. Geological Survey, the U.S. Fish and Wildlife Service, and the Wildlife Management Institute.

References


