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Wicked Leadership Competencies for Sustainability Professionals: Definition, Pedagogy, and Assessment

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Abstract:	Sustainability professionals need specialized leadership competencies to effectively influence the complex, uncertain, conflicted, and dynamic (i.e., wicked) sustainability challenges of our time. Higher educational programs can teach these leadership competencies and thus help professionals gain more influence and career success. This paper does three things: 1) defines and justifies leadership competencies sustainability professionals need to address wicked challenges, 2) describes a pedagogy to teach these competencies to professionals, and 3) evaluates whether intended learning outcomes were achieved in applications of this pedagogy.

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5 **Definition, Pedagogy, and Assessment**
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ABSTRACT

Sustainability professionals need specialized leadership competencies to effectively influence the complex, uncertain, conflicted, and dynamic (i.e., wicked) sustainability challenges of our time. Higher educational programs can teach these leadership competencies and thus help professionals gain more influence and career success. This paper does three things: 1) defines and justifies leadership competencies sustainability professionals need to address wicked challenges, 2) describes a pedagogy to teach these competencies to professionals, and 3) evaluates whether intended learning outcomes were achieved in applications of this pedagogy.

INTRODUCTION

Even when technological solutions exist to address sustainability challenges, lack of leadership can prevent their implementation. In response, prominent professional societies (e.g., National Association of Environmental Managers, International Society of Sustainability Professionals, Ecological Society of America) as well as numerous universities now offer programs to teach leadership competencies to sustainability professionals.¹⁻³ Not surprisingly, there is debate about what leadership definitions, theories, and practices are most relevant for sustainability challenges.³⁻⁸ This paper contributes to this body of work by proposing and assessing a specific set of leadership competencies sustainability professionals need

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3 in order to address the distributive, collaborative, and adaptive dimensions of
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5 wicked situations.
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10 In the section immediately below, we define a theory and type of leadership relevant
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12 to sustainability professionals confronting wicked challenges. Then, in the next
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14 section, we describe an education program designed to teach leadership
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16 competencies to working professionals engaged in environmental and sustainability
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18 careers. In the last section of this manuscript we evaluate the success of that
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20 program.
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26 LEADERSHIP for SUSTAINABILITY

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28 Leadership is a celebrated topic discussed in countless journals, self-help books, and
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30 professional development programs and is taught extensively in business, public
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32 administration, and military curricula.⁹ The core concepts--the ontology--of
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34 traditional leadership theories include a leader, followers, and the things leaders get
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36 followers to follow.¹⁰ Hence, traditional leadership theories emphasize attributes
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38 and actions of leaders (i.e., leaders are authentic, charismatic, honest, empathetic,
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40 visionary, servants) and how they motivate followers (e.g., through transformative
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42 motivation or transactional exchange).^{7,9} This focus on leaders and their
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44 characteristics has been popular and effective but, we and others argue, it is less
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46 appropriate for wicked sustainable development challenges.^{4,11,12}
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3 Instead, we recommend (and teach) the theory and practices of *shared* leadership.

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5 This leadership theory uses a different ontology where the basic elements of
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7 leadership are direction, alignment, and commitment.¹¹ When these three things
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9 occur, leadership has occurred. Direction results when stakeholders agree on goals
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11 and strategies to achieve these goals. Alignment results when stakeholders
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13 coordinate resources to implement the strategies to achieve those goals.
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17 Commitment results when stakeholders willingly work toward those goals, even at
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19 some sacrifice to self-interest. When all three outcomes—direction, alignment, *and*
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21 commitment—are present, then group action occurs, is effective, and can be
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23 sustained. This ontology shifts attention from attributes of leaders to the practices
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25 of stakeholders that promote direction, alignment, and commitment. Importantly,
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27 everyone can learn, apply, and improve upon practices that make direction,
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29 alignment, and commitment occur; that is, everyone can lead from where they are.
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36 Leadership guru Ronald Heifetz¹³ offers us a thought experiment to illustrate the
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38 critical difference between shared versus leader-follower theories of leadership:
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40 Imagine the different responsibilities and outcomes that occur when stakeholders
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42 assume that leadership means they will follow a leader's vision versus assuming
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44 that leadership means influencing one another to face shared challenges. In the
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46 leader-follower ontology, vision of the desired future condition comes from the
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48 leader and if something goes wrong with that vision or the process leading to it,
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3 fault lies with the leader. In the shared leadership model, goals emerge from the
4 stakeholders who must hold themselves accountable for the future they create and
5 the process for creating it.
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12 Many sustainable development challenges fall into a class of “wicked” problems.

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14 Wicked problems are open-ended, conflict rich, unique, dynamic, and resist
15 definition.^{12,14} We and others argue that the shared leadership ontology/theory is
16 more appropriate for the wicked problems.^{4,11} Below, we focus on the distributive,
17 collaborative, and adaptive dimensions of wicked problems.
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25 *Distributive:* Many of the most pressing sustainability challenges and opportunities,
26 such as climate change and supply chain risks, are distributed across vast,
27 complicated, tele-connected, and sometimes global systems. No “leader” has
28 authority over all the stakeholders who must be engaged because stakeholders
29 reside in different organizations and nations. Most actors will neither meet nor
30 interact. Many will not even realize they are connected. Nonetheless, coordination
31 must occur across these different scales of political, economic, and ecological units,
32 crossing boundaries of space, time, culture, and politics as solutions emerge, falter,
33 and/or scale.¹⁵
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49 *Collaborative:* Sustainability challenges require the exceedingly difficult and
50 stressful work of collaboration among people that have different assumptions,
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3 values, cultures, disciplines, and organizational obligations. Stakeholders often don't
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5 agree on what the situation is or what to do about it, and they may resist or ignore
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7 those who attempt to define it for them. Stakeholders must do this difficult work
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9 themselves; it can't be done for them by a "leader." They must voluntarily explain,
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11 defend, and develop shared interests and positions if commitment is to be
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13 sustained.^{13,14}
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20 *Adaptive:* Sustainability challenges require being adaptable to continual change and
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22 high uncertainty. The rate of technological, social, and environmental change has
23
24 never been greater.¹⁶ Moreover, stakeholders are unpredictable. They change as
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26 they encounter and learn about new conditions and new opportunities.¹⁴ Their
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28 changed values and new goals trigger feedback loops that create new, unique
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30 system dynamics that require new interventions and course corrections that in turn
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32 require continuous re-engagement, learning, and compromise. Causation will be
33
34 unknowable and control impossible in these dynamic and emergent conditions,
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36 making less effective rational problem-solving leadership styles that rely on
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38 mobilizing stakeholders to analyze, predict, and control situations. Instead, we need
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40 leadership approaches that put the burden on stakeholders for learning-by-doing,
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42 which requires transparency, communication, failing, and adapting.¹⁷
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3 Note that we further elaborate on the meaning of distributive, adaptive, and
4 collaborative leadership below (see Table 1) when we describe how we teach this
5 content and how we assess whether learning occurred.
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10 11 12 THE PEDAGOGY 13

14 Our program, like other curricula reviewed by Shriberg and MacDonald,³ explicitly
15 integrates leadership into a graduate-level sustainability curriculum targeting
16 working professionals. We describe below, in broad outlines, the structure of that
17 program, then we discuss key aspects of the pedagogy related to distributed,
18 collaborative, and adaptive leadership.
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29 Beginning in 2010, we designed a cohort-based, executive graduate program for
30 students with diverse academic, disciplinary, and professional backgrounds.
31 Students are typically mid-career professionals (age range is 25-65; average age is
32 40) and currently employed with at least three years of professional work
33 experience. Cohort sizes range from 20 to 32 with roughly equal representation
34 from each of three sectors: business, government, and civil society. The
35 approximately one-year program meets face-to-face one weekend a month, typically
36 near Washington, DC, where students engage with their peers, faculty, guest experts,
37 and project clients. In the intervals between meetings, the hybrid curriculum
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3 includes asynchronous online learning units and synchronous virtual teamwork on
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5 projects.
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10 The multidisciplinary program begins with a “boot camp” to bring everyone up to
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12 the same level of understanding of sustainable development concepts,
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14 communication skills, systems thinking, and leadership tools commonly found in
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16 other programs.² The program takes a deep dive into leadership practices relevant
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18 to the different levels of social interaction where sustainability professionals work:
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20 individual, team, organization, network, and societal scales (Table 1 contains more
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22 detail). The program then paces students through a series of learning modules
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24 about the science and the leadership of sustainable development challenges in the
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26 US (e.g., water, climate, energy, food and agriculture, urbanization, supply chains).
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28 The program concludes by providing a global perspective, including international
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30 travel and project work. Projects, speakers, clients, and experts represent a mix of
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32 government, business, civil society perspectives. Throughout the program, students
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34 also focus on expanding their professional networks, refining their career plans, and
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36 advancing an independent study project designed to complement their professional
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38 development goals.
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47 The program is divided into monthly modules with four main parts: 1) reading and
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49 prep-work done remotely; 2) an intense, face-to-face meeting with peers, faculty,
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3 experts, clients and time to do team work, practice leadership, and interact socially;
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5 3) teamwork and study time to complete project analysis, priority setting, and to
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7 prepare deliverables; and 4) formal reflections about lessons learned that can
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9 generalize to their careers. We use pedagogies that are problem based,^{18,19} require
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11 shared inquiry,¹⁹ create opportunity to be reflective about lessons being learned,²⁰
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13 and provide multiple touches on key topics so students can work through the
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15 learning cycle.¹⁹ Thus, our program shares the common attributes that Shriberg and
16
17 MacDonald found in their survey of programs: network building, project-based
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19 learning, and systems thinking.³ Importantly, the experiential pedagogy provides
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21 students a safe space to try out and practice leadership tools, roles, and styles.
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29 Table 1 lists the leadership competencies related to distributive collaborative, and
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31 adaptive leadership (many other competencies are targeted but not discussed here).
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33 Importantly, we focus less on attributes of leaders and more on leadership practices
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35 that facilitate direction, alignment, and commitment.
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40 The rows in Table 1 distinguish among three types of leadership competencies:
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42 awareness, tools, and network. Leadership begins with *awareness* of self and others.
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44 To influence others, you need to first know your own traits, tendencies, biases,
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46 values, and assumptions so you can then recognize, understand, and, manage those
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48 attributes in others. We provide and interpret diagnostics designed for this
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purpose. *Tools* are frameworks, best practices, and approaches that people use to facilitate leadership outcomes. They are tools in the sense that they fit different situations, produce different outcomes, and are stored in a metaphorical toolbox to be brought out and applied as need arises. We assume that a person’s leadership competency increases with the more tools they know and the more practice they have using those tools. A *network* further enhances a person’s leadership competencies because it provides access to role models, mentors, peers, opportunities, support, feedback, and just-in-time useful information.

Limitations of space and reader interest prevent full descriptions of all table entries.

We have selected one leadership competency from each column (noted in bold in Table 1) for elaboration in text below.

Table 1: Selected Leadership Competencies

Outcome Type	Distributive	Collaborative	Adaptive
Awareness (of self and others)	<ul style="list-style-type: none"> ▪ Influence without authority style ▪ Control and inclusion profile 	<ul style="list-style-type: none"> ▪ Personality, values ▪ Cross-cultural awareness ▪ Transdisciplinary ▪ Interdisciplinary 	<ul style="list-style-type: none"> ▪ Learning style ▪ Conflict styles
Tools (frameworks, best practices, approaches)	<ul style="list-style-type: none"> ▪ Collective Impact ▪ Community of Practice ▪ Scaling up innovation ▪ Systems mapping ▪ Social media ▪ Storytelling ▪ Impact words and writing 	<ul style="list-style-type: none"> ▪ Cross-sector partnering ▪ Boundary spanning leadership ▪ Ladder of abstraction ▪ Fist-to-Five ▪ Yes-And ▪ Team principles ▪ Project management ▪ Conflict facilitation ▪ Negotiation 	<ul style="list-style-type: none"> ▪ Sense making ▪ Theater Improvisation ▪ After Action Review ▪ Peer Assist ▪ Receive and give feedback ▪ Adaptive management ▪ Holding environments ▪ Social innovation ▪ Double loop learning
Network (peers, opportunities, information)	<ul style="list-style-type: none"> ▪ Examples of exemplary professionals who discuss their careers and influence in terms of 	<ul style="list-style-type: none"> ▪ Examples of exemplary professionals who discuss their history and success due to collaboration 	<ul style="list-style-type: none"> ▪ Examples of exemplary professionals who discuss their ability to work with uncertain and dynamic

	influencing distributed networks. ▪ Access relevant global knowledge networks. ▪ Peer network	▪ Access relevant global knowledge networks. ▪ Peer network	situations. ▪ Access relevant global knowledge networks. ▪ Peer network
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Items in bold are discussed in more detail below.

Distributive leadership using Collective Impact: The Collective Impact method is a set of best practices that help coordinate people distributed across space and time, working in different organizations, who may never meet one another. Successful efforts at generating collective impact tend to share five conditions: common agenda, shared measurement, mutually reinforcing activities, continuous communication, and backbone support.²¹ Practicing distributive leadership such as Collective Impact is difficult to replicate within the limitations of academic semesters, especially when students have full-time jobs and are geographically separated. So, to teach it, we tap into ongoing efforts and use problem-based learning pedagogies. For example, we visit a city where a multi-stakeholder collaborative effort is attempting to reduce carbon emissions. We study how multiple actors, organizations, and public and private programs coordinate their efforts, including green building programs, transit oriented development, renewable and low carbon fuels, district energy, and “green games” to motivate business and household conservation. We meet with key stakeholders and have them describe their processes, successes, and struggles. We assign students a consultancy-like

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3 project using the Collective Impact tool to analyze and suggest improvements to the
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5 processes.
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10 **Collaborative leadership through cross-sector partnering:** Challenges such as
11 climate change are not only beyond the scope of individual organizations, they are
12 beyond the scope of any single sector (i.e., business, government, or civil society).
13 Solutions therefore require, among other things, cross-sector, inter-organizational
14 partnering. Partnering best practices include doing due diligence on partners'
15 strengths and risks, establishing mutually beneficial shared goals, creating a
16 learning culture, and designing governance structures that are transparent and hold
17 actors accountable.²² We teach these best practices using shared inquiry and
18 problem based learning pedagogies. We identify an ongoing innovative cross-sector
19 partnership addressing a sustainability challenge and ask students to use partnering
20 best practices to study and critique the partnership's efforts. We bring into the
21 classroom a partner from each sector (business, government, and civil society) to
22 discuss their roles, motivations, and partnering tips and challenges. Students
23 prepare a report for these "clients" summarizing observations, recommendations,
24 and lessons learned.
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48 **Adaptive leadership through sense-making:** Rational problem analysis and
49 reductionism don't work well when confronted with the immense complexity,
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3 uncertainty, and dynamism of major sustainability challenges.¹⁰ Sense-making is an
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5 alternative and more appropriate approach for these highly uncertain, contentious,
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7 wicked challenges.¹⁷ It avoids analysis paralysis of rational planning by emphasizing
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9 actions that help make sense of a situation rather than expecting to eliminate
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11 uncertainty, impose control, and solve the problem.¹⁶ We teach a method of sense-
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13 making that maps stakeholders' concerns and influence, the strategies they use to
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15 affect change, the system properties and feedback loops where leverage can be
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17 exercised, and the outcomes used to guide and evaluate success. For example,
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19 students engage in a several month effort to make sense of a project identified by
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21 faculty as demonstrating leadership for sustainability. The exercise requires
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23 students to quickly become familiar with a situation new to them (most projects are
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25 based in rapid developing countries such as India and China). They begin with desk
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27 research using reports by stakeholder organizations, and follow with email and
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29 phone interviews, as well as a site visit to ground truth and dig deeper.
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LEARNING OUTCOME ASSESSMENT

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43 In this section we discuss the method used to assess whether the program and
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45 pedagogy produce meaningful learning outcomes.
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3 An online survey was administered several weeks before students entered the
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5 program and several weeks after they completed the program. Pre-post paired t-
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7 tests were used to evaluate changes in student perceptions of these leadership
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9 competencies.
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15 The specific survey questions used to operationalize learning outcomes are listed in
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17 Table 2. For each competency, students were asked to evaluate its *importance* (How
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19 important is this topic/skill for your success and impact as a sustainability
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21 professional?) and *performance* (How well do you perform or understand this
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23 topic/skill?). Students answered the questions on a 5 point Likert scale with 1 being
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25 least important or having the least understanding to 5 being the most important and
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27 having the most understanding. The three sets of leadership learning outcomes—
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29 distributed, collaborative, and adaptive—are so broad and diverse that no attempt
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31 was made to develop psychometric indicators with multiple items for each concept.
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34 Such an assessment would have been unwieldy given we also assessed several
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36 dozen other learning outcomes not reported here. Hence, a limitation of the study is
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38 the limited reliability of single-item measures and further limited by self-
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40 perceptions of these learning outcomes.
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We surveyed two cohorts of students, 29 who graduated in 2016 and 28 who graduated in 2017. In total, 55 students completed both the pre- and post-survey.

The results of the pre-post comparison are reported in Table 2.

Table 2: Learning Outcome Assessment

Attribute	Importance				Performance			
	Pre	Post	t	p	Pre	Post	t	p
<i>Distributive Leadership Competencies</i>								
Ability to practice leadership without having authority or power over others.	4.6	4.9	3.4	.001	3.1	4.2	7.3	.000
Ability to enhance learning across a network of actors from different organizations and locations.	4.4	4.6	2.4	0.2	2.5	3.9	8.5	.000
Ability to scale up solutions that work in one situation so they spread and work in other situations.	4.4	4.6	1.0	0.3	2.4	3.7	9.2	.000
<i>Adaptive Leadership Competencies</i>								
Personal confidence to dive into complex projects full of uncertainty and conflict.	4.4	4.8	3.2	.002	3.6	4.3	6.2	.000
Ability to manage teams that tackle complex, ambiguous problems that resist definition.	4.5	4.8	2.6	.012	3.1	4.0	5.1	.000
Understand feedback loops, uncertainties, nonlinearities, intractable value conflicts, and other attributes of complex, adaptive systems.	3.8	4.3	3.1	.03	1.8	3.3	10.2	.000
<i>Collaborative Leadership Competencies</i>								
Ability to understand teammate motivations and characteristics and use this information to enhance teamwork.	4.5	4.8	2.5	.015	3.4	4.2	4.9	.000
Ability to build and maintain trust among others.	4.6	4.9	3.4	.001	4.0	4.5	4.5	.000
Ability to collaborate with actors from business, government, and civil society.	4.6	4.9	3.3	.002	3.1	4.3	8.7	.000
Ability to identify, analyze, map, and prioritize stakeholders' interests and resources.	4.5	4.8	3.1	.04	2.9	4.2	9.4	.000

Paired t-tests were calculated independently for each leadership attribute to compare students' perceptions prior to the graduate program (pre) with their perceptions upon completing the program (post). "Importance" refers to how important is this leadership capacity to being a successful and impactful sustainability

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3 professional. "Performance" refers to student's self-assessment of how well they personally possess that ability
4 to produce that outcome. The scale ranges from 1 (low) to 5 (high).
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7 Prior to beginning the graduate program, most students recognized the *importance*
8 of distributed, collaborative, and adaptive leadership competencies. The average
9 rating for each item was above 4 on a 5-point scale. Despite initial ratings that left
10 little room for improvement, importance ratings did increase when the survey was
11 repeated at the end of the graduate program. Although the increases were small
12 (i.e., from 4.6 to 4.9 on a scale of 5), most changes were statistically significant.
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23 Student's ratings of their *performance* on each competency increased dramatically
24 from pre to post program. Without exception, these increases were statistically
25 significant. Performance increase by more than 20% on half of the learning
26 outcomes (i.e., a 1-unit increase on a 5-point scale such as from 3.1 to 4.2). These
27 results suggest our pedagogy was successful. Students' self-assessments of their
28 ability to perform distributed, collaborative, and adaptive leadership practices
29 increased. While successful, our pedagogy has room for improvement. In the years
30 ahead, we aspire to post-program performance closer to 5 out of 5.
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47 CONCLUSION

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3 The main contribution of this paper is our attempt to define a subset of leadership
4 practices and competencies that help sustainability professionals address wicked
5 challenges. We argue that the Direction-Alignment-Commitment ontology and
6 theory of shared leadership are appropriate for the wicked situations typical of
7 sustainability challenges. Further, we argue that sustainability professionals will be
8 more influential and relevant to these challenges if they have a tool box of
9 leadership practices designed to address the distributive, collaborative, and
10 adaptive aspects of wicked challenges. Importantly, we also argue that all
11 stakeholders can help facilitate direction, alignment, and commitment. Thus,
12 everyone can lead from where they are, not just those in a position of authority or
13 designated as a leader.
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31 The graduate program we developed helps working sustainability professionals
32 master this leadership theory and related practices and competencies (the program
33 also emphasizes many other learning outcomes not discussed here). In this paper,
34 we discussed a subset of the leadership competencies we teach and evaluated
35 student perceptions of lessons learned. We found that the program delivers positive
36 outcomes: students finished with an increased appreciation for the importance and
37 an increased confidence in their ability to perform distributed, collaborative, and
38 adaptive leadership practices. Of course, these findings are limited by data derived
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3 from student self-reports, so subsequent studies should focus on, for example, how
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5 often and how well graduates use these skills in their day-to-day work.
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10 There exists a large literature and deep tradition of leadership education that
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12 sustainability professionals and educators can draw on. We see great potential in
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14 additional bridge-building between leadership and sustainability literature,
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16 especially as it applies to wicked problems. We advocate continued vigorous debate
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18 about which leadership theories, ontology, and practices are most useful for
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20 sustainability professionals and what pedagogies work best to build leadership
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22 competencies.
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