Issues In Interdisciplinary Studies,
Vol. 41 (2), Fall 2023, pp. 77–100

TEXAS TECH
UNIVERSITY PRESS

Troubling Leadership in the Interdisciplinary Challenge-Based Classroom

M. Winter
University of Edinburgh, Scotland

David Overend
University of Edinburgh, Scotland

Abstract: Leadership is an elusive and widely debated concept across disciplinary boundaries and is often contested in scholarship of learning and teaching. This article troubles models and conceptualisations of leadership in Students as Change Agents (SACHA), an interdisciplinary challenge-based course offered at the University of Edinburgh, Scotland. "Troubling" is understood as the unearthing or undermining of existing hegemonic assumptions about a concept. Through an analysis of survey data and qualitative interviews with students and staff on the course, along with group dynamic analysis, we explore a case of an interdisciplinary, challenge-based classroom as a space for, and of, contestation of leadership. In this article, we trouble leadership by (1) highlighting how the role of the coach and the interdisciplinary, challenge-based course design destabilize familiar patterns of teamwork and leadership and (2) emphasizing how notions of leadership are rooted in subtle disciplinary commitments. This analysis leads us to characterize "interdisciplinary leadership" as a temporal sensibility where interdisciplinary teamwork requires a high degree of flexibility and responsiveness. This research contributes to the practical facilitation of teamwork in these contexts where leadership can be better learnt and taught if understood as a temporal sensibility that can be taken up, put down, passed around, and shared by any and all members.

Keywords: challenge-based learning, Edinburgh Futures Institute, interdisciplinarity, leadership, teamwork

Leadership is like beauty, it is hard to define, but you know it when you see it.
(Bennis & Nanus, 1985, p. 41)

ISSN: 1081-4760

IIS_41-2_2P.indd 77 7/10/24 6:30 AM

Introduction

High-impact educational practices, including interdisciplinary and challenged-based learning and teaching, are garnering increased attention in higher education institutions (HEIs), where they have the potential to enhance student engagement, academic success, and even retention rates (Kuh, 2008; Carmichael & LaPierra, 2014; Stephen & Rockinson-Szapkiw, 2021; Quaye et al., 2019). Similarly, there is growing pressure for universities to provide a more holistic education, including soft skill development and teamwork abilities, to better prepare students for working life (Cinque, 2016; Ornellas et al., 2019; Thornhill-Miller et al., 2023). Reports prepared by industry (Morrison et al., 2011; Mourshed et al., 2014), government (Crosier et al., 2015; European Commission, 2012), and HEIs themselves (University of Edinburgh, 2019) show the already emerging consequences of such skill gaps. The development of leadership skills is amongst the primary concerns in these reports. A relatively recent literature has brought together these two concerns, linking high-impact education practices with leadership development (Crosby, 2016; Jenkins & Endersby, 2019; Petre, 2020). In this article, we focus our enquiry on Students as Change Agents (SACHA), an interdisciplinary course at the University of Edinburgh, Scotland. With its challenge-based design and learning outcomes like critical thinking, team working, problem solving, collaboration, confidence, innovation, resilience, and integrity, SACHA is a well-suited empirical site to interrogate interdisciplinary leadership. Although leadership is not an expressed learning outcome of the course, it emerged consistently and persistently in our interviews with students and staff, as well in conversations amongst our team upon reviewing the results of our analysis of group dynamic.

The aim of this article is to "trouble" leadership, by demonstrating how various disciplinary viewpoints have emerged, and are held by students and staff involved in SACHA. This empirical evidence points towards the interdisciplinary classroom as a site of contestation of leadership and team working roles. This troubling is an important step towards both theorizing interdisciplinary leadership, as well as practicing and teaching its related skill sets. There is in fact an existing precedent for troubling leadership. One such paper, aimed at troubling notions of the "ideal" (male) leader argues, "it is time to challenge traditional, masculine views of leadership and ideal leaders and question how leaders are developed" (Bierema, 2016, p. 129), while another troubles the role of "niceness" in leadership education (Wiborg, 2022). Essentially, *troubling* is the unearthing or undermining of existing hegemonic assumptions about a concept.

SACHA originated in 2019 at the University of Edinburgh as an extracurricular program organized and operated by the Careers Service. In the years that followed, more than 30 external partners contributed to the program's success, with over 1200 students enrolling. Then, in January 2022, the course

IIS_41-2_2P.indd 78 7/10/24 6:30 AM

was offered as a curricular option for the first time by Edinburgh Futures Institute (EFI), a large cross-school institute at the University of Edinburgh. This undergraduate course was part of an evolving curriculum of elective interdisciplinary modules designed to broaden student skill sets to navigate complex futures.

In SACHA, students work in small groups made up of members across disciplines in response to a prompt from an external partner given at the beginning of the term. The course was initially offered to students from different degree programmes, which has included subjects as diverse as archaeology, Chinese, economics, English literature, environmental geosciences, fashion, German, graphic design, history, politics, product design, psychology and sociology. Teams are formed to ensure a balanced diversity of students, ensuring they collaborate with others they might never otherwise have met. This remains the case, but in September 2023, EFI launched a new undergraduate degree programme in interdisciplinary studies. SACHA is now a core course in the first year of the programme, which brings students enrolled on a four-year interdisciplinary degree together with those whose studies are aligned with a specific discipline. Data for this article was collected during the spring terms of 2022 and 2023, which predated the launch of the degree programme and was therefore undertaken by students on discipline-based degree programmes.

The partner organisation is selected for the interdisciplinarity of its remit and activities. For example, the partner for the initial pilot run of the module in 2022 was the Data for Children Collaborative who posed the question, "How might the mental health of children living in Scotland be improved?"; the following year the question was, "How can we effectively communicate and engage with marginalised communities in order to empower climate action?" Future iterations of the course include questions about safeguarding children and diversity in the construction sector. The groups typically meet twice a week, once with their coach and once without, with the aim of presenting a set of recommendations back to the partner, alongside a written report. In addition, all students come together several times to receive feedback from each other and course organizers on their progress. Importantly, SACHA is graded on a pass/fail metric, meaning no number or letter grades are assigned.

One of the key features of SACHA is the use of "coaches" as opposed to tutors or lecturers. This distinction was initially envisaged to better empower students to take ownership over their work and have coaches facilitate rather than direct their groups' meetings. However, the concept of coaching in higher education is not clearly defined. Expressing a preference for one-on-one coaching but nonetheless acknowledging the potential of group coaching in classroom settings, Christian van Nieuwerburgh points out that "educational organisations have used the term 'coaching' quite loosely, to refer to number of widely differing approaches" (2018, p. 7). He nonetheless defines educational coaching as

> a one-to-one conversation focussed on the enhancement of learning and development through increasing self-awareness and a sense of personal responsibility, where the coach facilitates the self-directed learning of the coachee through questioning, active listening, and appropriate challenge in a supportive and encouraging climate. (van Nieuwerburgh, p. 17)

This definition resonates with the accounts of students and coaches in SACHA, who frequently emphasise self-directed learning in their discussion of the course, identifying both the challenges and opportunities of this approach. We have also observed the use of questioning, active listening, and appropriate challenge in coaching sessions, which have informed our understanding of the role of the coach on this course. SACHA coaches include academics working in different schools across the university, postgraduate tutors undertaking doctoral research in a range of subjects, and professional services staff with an active involvement in interdisciplinary education at EFI. This broad range of professional, educational, and disciplinary backgrounds leads to a diversity of coaching styles and understandings of leadership as well. We examine how the disciplinary training of coaches also informs their perception of leadership in their groups.

Referring to the educator as a "coach" signals a different orientation to that of more familiar tutor-led models. Students understand that they are embarking on a learning journey that will depart from conventional course structures. It is made clear that the coach may be new to the topic that the groups are researching and that their role is to facilitate a group research process rather than to share knowledge or expertise in the topic (capacities that might be aligned with a leadership role in more discipline-based pedagogical models).

During the weekly coach-led sessions at the start of the semester coaches guide the students through a series of structured learning activities, which use a virtual workspace programme to work with datasets, map relevant networks and stakeholders, and practice ideation. Later in the course, a more open exploratory process is encouraged, with groups reporting on progress each week as the coach asks questions and offers feedback. There is a strong reflective element to activities throughout the course, and a key function of the coach is to guide the students to consider teamworking strategies and roles. The learning outcomes of SACHA emphasise "development of the core skills, tools and mindsets of a "change agent": critical thinking, team working, problem solving, design thinking, collaboration, confidence, innovation, resilience and integrity" (University of Edinburgh Course Catalogue, 2022). Leadership is not mentioned directly in the course documents but emerges as a key concern for students and educators, both of whom encounter a process of ongoing allocation of roles and responsibilities as they develop models for teamworking and work towards their final report and presentation to the partner organisation.

Since its launch, SACHA has been of interest to researchers keen to understand the nuances of the interdisciplinary classroom. Our team focused initially on students' emotional journey through uncertainty and excitement, anxiety and frustration, to confidence and pride. An earlier report prepared in 2022 by Students Organising for Sustainability United Kingdom for the University's internal use provided a summary of survey results concerning coaches on the extracurricular version of SACHA but did not deal directly with leadership. This article expands and develops this work by focusing on this important dimension of the student learning experience on the course, and including the perspectives and experiences of coaches, who are often actively and consciously reframing and repositioning leadership roles. The article aims to develop a wider perspective on the course, which considers the importance of leadership in the context of interdisciplinary learning and teaching.

Leadership Models

Leadership is an elusive, and widely debated concept across disciplinary boundaries (Doh, 2003; Landis et al., 2014). The topic is its own expansive field of study, with both theoretically driven (leadership studies) and applied (leadership development) components. The development of leadership capabilities amongst university students has become a notably common, explicit priority, for higher education institutions (Skalicky et al., 2018). According to some national surveys, modules or programs with specific learning outcomes related to leadership skills have increased considerably over the past few decades (Dugan & Komives, 2007; Haber, 2011a). Although there are numerous types of leadership identified and discussed in the literature, here we will review three primary theorizations of leadership: the leader-centric perspective; the process-oriented perspective; and the systems-perspective of leadership (Haber, 2011b).

The subject of the leader-centric perspective is exclusively the leader themselves as an individual. It is informed by Darwinian concepts of innate greatness, initially associated with royalty and privilege (Komives et al., 2009). Early studies of leadership based on the leader-centric perspective sought to identify and analyze traits held by *great men* (Bass & Stogdill, 1990). These traits include confidence, integrity, maturity, energy level, and stress tolerance (Elmuti et al., 2005). Such an approach to leadership could implicitly undermine the belief that leadership can be taught, and therefore the role of universities in the development of leadership skills (Channing, 2020), although most models do posit that leadership can be developed (Katz, 1955).

This approach has garnered criticism related to its validity and utility as it does not account for context and has almost exclusively focused on white men in high-visibility positions of power, like in the military or political sphere

(Antonakis et al., 2004; Northouse, 2007). Additional research conducted with the leader-centric lens takes the behaviour of leaders as its point of departure, with the assumption that leaders inhabit a position above those they manage, that they have an authoritarian relationship with their followers—sometimes referred to as the industrial paradigm (Rost, 1991). For critics, this formulation is an oversimplification of the inter-relational aspects of groups (Haber, 2011b).

The process-oriented perspective of leadership emerged from work which sought to distinguish between the concept of power and leadership (Burns, 1978). According to this perspective, leaders do not necessarily have unidirectional relationships with those that follow them. Instead, relationships between leaders and their followers are "relational, collective, and purposeful" (p. 18). Within this framework there are two types of leadership: transactional and transforming. Styles of leadership related to leader-centric perspectives would then fall within the transactional category. In contrast, transforming leadership is relational—it is about interaction and collaboration between group members and their leader. Now familiar leadership styles, like servant leadership (Greenleaf, 2002, 2008), authentic leadership (Avolio & Gardner, 2005), and inclusive leadership, for instance, are considered by some to be types of transformative leadership (Dugan & Komives, 2010). Although process-oriented leadership broadened the scope of leadership beyond the individual, it also rendered it far more abstract and intangible (Haber, 2011b); it too lacks contextual awareness.

Finally, systems-perspectives locate leadership within broader systems, like organizations, with the capacity to expand, reflect, change, and improve (Senge et al., 2015). Given this attention paid to context, the systems-perspective includes concepts like adaptive leadership (Heifetz et al., 2009), learning organizations (Senge, 2006), and networked organizations (Allen & Cherrey, 2000). This characterization of leadership as complex, made up of experiences and influenced by systems and context, is a relatively recent development in the study of leadership. It augments the pre-existing scope of leadership literature to include ethical issues (Shakeel et al., 2019). Amongst related theories of leadership are team leadership (Zaccaro et al., 2001) and complexity leadership (Uhl-Bien et al., 2007), which more explicitly examine power within systems by decentring the leader and instead paying closer attention to power and hierarchy.

Disciplinary Concepts of Leadership in Higher Education

In higher education institutions, leadership is discursively constructed as a set of skills that can be acquired. Therefore, the leader-centric perspective, at least in its essentialist embodied formulation, does not exactly resonate. Instead, the impetus for the proliferation of leadership courses aimed at developing

IIS_41-2_2P.indd 82 7/10/24 6:30 AM

leadership skills in undergraduate students is most characterized in response to labour market demands. For example, researchers have noted that engineering programs have "often neglected leadership education and/or training" (Bayles & Robe, 2010, p. 1). This is problematic because "technical competence is absolutely necessary but not sufficient for carrying out the professional responsibilities of today's engineers" (p. 2). Therefore, leadership is characterized as something that can be taught; a set of skills to be accumulated, in response to one's environment, and hence more closely resembling the process and systems-oriented perspectives. Nevertheless, this approach still locates leadership within the leader; the main unit of examination and for improvement is the person—effectively still reifying leader-centricity.

The development of leadership skills amongst undergraduate students outside of the classroom in extra-curricular pursuits, as student-athletes (Ivashcenko et al., 2017) or as representatives in student governance structures (Aymoldanovna et al., 2015) are well-documented. In the classroom, concern over the assessment of leadership abilities has led to the development of frameworks to better account for skill acquirement in specific disciplines. Disciplines with a distinctly professional pipeline for students, like engineering and business management, take a pragmatic approach to teaching leadership. For instance, educators have defined six Elements of Engineering Leadership: character development, business knowledge, interpersonal skills, intrapersonal skills, management skills, and the study of leadership (Farr et al., 1997; Daley & Baruah, 2021). Similarly, business schools are especially concerned with the development of leadership abilities in the context of entrepreneurialism and management, resulting in it being a learning outcome for courses across MBA programs (Okudan & Rzasa, 2006).

In contrast, theatre studies has sought to understand leadership through the practice of performance and aesthetic (Katz-Buonincontro, 2011), characterizing "leadership as an art" and considering it against flawed hero narratives of dramatic, epic, and post dramatic theatre (Biehl-Missal, 2010). Scholars in sociology want to better understand the origins of leadership (Garfield, Syme, & Hagen, 2020), dealing with it as a political phenomenon bound up in systems of power, decision making, and identity (Ernest, 2003; Viviani, 2017). In this instance, essential theories of power by theorists like Bourdieu and Foucault inform the teaching of leadership (Bogotch et al., 2008; Gunter, 2010). Unsurprisingly, teaching and training around leadership in anthropology is informed by "methods that take sociocultural dynamics seriously," where leadership is placed in its sociocultural context and understood as "primarily non-discursive" (Johnson, 2007).

Defining, teaching, and assessing leadership remains a challenge in the context of higher education (DeRue et al., 2011). There are numerous complex, overlapping, and contradictory theories of leadership which translate into a variety of uniquely disciplined teaching practices. Our data, collected from

IIS_41-2_2P.indd 83 7/10/24 6:30 AM

SACHA, is consistent with a multiplicity and dynamism of leadership education and further reveals the various concepts of leadership at work at once from a variety of perspectives.

Mixed Methods

The data upon which this article is based were collected through a variety of methods. Throughout the inaugural delivery of SACHA beginning in January 2022 we collected questionnaires and journal entries from participants, interviewed both students and coaches, and video recorded selected group meetings. This amounted to 14 questionnaire responses, 15 recorded two hour coached sessions across two different groups, three full course meeting recordings, three recordings of one group's independent meetings, and in-depth interviews with three students and four coaches. In the 2023 iteration of SACHA, we changed our approach to work more closely with some students and groups. Our data collection included interviewing two students on the course three times across the term to better understand their experience as individuals, and a group dynamic intervention. Mid-way through the semester we recorded a coached session for three groups, then transcribed and coded the discussion to be analyzed through the discourse analysis tool, ID Lab, as will be described below. We then prepared a presentation to share our findings back with each group within a week, encouraging them to reflect on their participation as individuals and their functionality as a team. Alongside this we also collected 15 course feedback survey responses and reviewed the student's reflective essays. These various data sources allowed us to triangulate our findings, which led us to consider various and disparate perspectives on leadership.

Two distinct techniques were employed to analyze the bulk of the data. First, interviews and group meetings were transcribed, and then coded on NVivo. NVivo is a software that allows for qualitative data to be coded, enabling the grouping of phrases and sentiments for a broader picture of dominant themes as well as comparisons across texts. Second, Interactional Discourse Lab (IDLab) was used to consider conversational interactions and group dynamics. IDLab is an open-source tool that captures "talk-in-action" using a combination of qualitative and quantitative methods (Choi, 2016). The software allows for patterns to be drawn about who speaks when and how they are speaking—whether they agree, explain, or challenge, for instance. Our team of researchers met on multiple occasions to discuss our impressions of the data and its analysis, at which point it was clear that leadership was a prominent theme.

The following section presents the conflicting perspectives of leadership, highlighting how the unique interdisciplinary, challenge-based environment

IIS_41-2_2P.indd 84 7/10/24 6:30 AM

on the SACHA course has productively troubled static conceptions of leadership and leaders. Our findings show that students, coaches, and researchers held different perspectives concerning whether a leader emerged, and if so, who they were, in any given group. The mixed method research design provides an opportunity to understand leadership both as it is experienced and perceived by different participants (including students and coaches) and as it is observed and analyzed by the researchers. Furthermore, we found that disciplinary perspectives on leadership informed the varied conclusions about leadership within the groups.

The Role of the Coach and The Interdisciplinary Challenge-Based Classroom

The data we collected revealed two aspects of the course that made it a space for, and of, contestation, where debates about leadership bubbled below the surface or emerged explicitly: (1) the role of the coach and (2) the interdisciplinary challenge-based design. Considering the concept of leadership from multiple perspectives on this course suggests that leadership is a temporary and contingent relationship between group members—a sensibility that can be taken up, put down, passed around, and shared by any and all members. In this sense, SACHA can be understood as a context for trying out, experimenting with and taking up leadership at different points in the process for varying durations and with a range of impact and influence. We therefore understand leadership as a temporal sensibility. Our concept of temporal sensibility is informed by recent research to do with the development of leadership skills as relational sensibilities. A sensibility is to do with responsivity to an emergent and dynamic phenomenon; the concept of sensibility emphasizes the temporal quality of leadership where the role shifts and evolves (Giles et al., 2015).

The role of the coach as a facilitator, rather than a de facto leader, is the impetus for the troubling of leadership in the SACHA interdisciplinary challenge-based classroom. Students realize quite quickly that the course is "different to all the 'regular' lecture-based courses" (Survey 1) largely because, as another student explains "compared to tutorials, our meetings are not *led* [emphasis added] by tutors and I felt this encouraged more discussion between ourselves, rather than having to be 'picked on' by a tutor" (Survey 5). Another student remarked, "it isn't that we are taught new knowledge in the way of other courses, but that we are guided to learn skills in our own way" (Survey 2). Coaches themselves also noted this distinction: "tutoring is more directive," while coaching is "a lot more freewheeling," where "I felt a lot more like I was winging it," being "reactive to students in terms of what they were discussing" (Interview 5) and working as a "facilitator or enabler of students' activities" (Interview 6).

IIS_41-2_2P.indd 85 7/10/24 6:30 AM

The shift from tuition to mentorship that is represented by the term "coach" has implications for the function of leadership within SACHA groups. This can lead to a challenging situation in which neither students nor coaches are working within their comfort zone or are able to fall into habitual patterns of group work. One coach refers to it as "a bit of a balancing act," which arises "because we want to give them agency and to go out and do whatever they want [but] that's quite a big ask for especially first year students" (Interview 5). Mid-course feedback and interviews with students revealed they found the first few weeks of the term stressful as there was "almost too much freedom," that there was a sense of aimlessness (Survey 3). Coaches resisted being overly directive, instead encouraging the students to make decisions on their own. This dynamic is well described by a student (Interview 2):

> In our weekly tutorial meeting with [our coach] where we were asking [them], "Oh, should we be doing this?" or we were like, "what should we be doing here?" [they] were just kind of saying, "it's up to you." So, I think it was an initial shock of like, well, we actually are meant to be doing everything ourselves. We kind of got over it, and then we quite enjoyed it being a very independent thing. But there were definitely times where we were like a bit panicking about what should we do, but we overcame those.

In our previous research, we have traced the emotional experience of the students, tracing a journey from confusion and frustration towards confidence and pride, while also acknowledging the problem of exclusion from group progress experienced by some students. This article is, in part, concerned with how leadership emerged in response to the deferral of the role of leader that arises from the coaching model. Coaches thought carefully about their interactions with groups, aware of their uneasiness due to the lack of structure. For instance, one coach explained, "There was a lot of thinking going on on my part about how we get to the next step, how we shuffle forward and trying to mitigate the sense of anxiety and frustration that was often quite palpable in the room" (Interview 4). By the end of the term most students were more optimistic about the self-led nature of the course, noting that it "creates one of the biggest opportunities, which is to experience how to do independent research, set out own goals and deadline, and in the end create a piece of work that is truly ours" (Survey 4).

The course design contributes further to the troubling of leadership. The problem posed by the external partner in both iterations of the course in 2022 and 2023 encourages students to research and think across and through disciplinary boundaries. The texture of the question coupled with the independent mode of teamwork means that it is unlikely any one student will be an "expert" on the topic, or that a leader might emerge based on any specific content knowledge. The coaches additionally noted that, even if they were to take on a more directive role, they would struggle to, as they were learning about the problem alongside the students. For instance, one coach explained,

IIS_41-2_2P.indd 86 7/10/24 6:30 AM

"I don't actually need to know very much of anything about what is it they're researching. What I do need, is to be competent at overseeing the process and giving them some strategies to undertake their own research" (Interview 4).

Some students sought the course out specifically for this novelty: "I wanted to do something else that was quite different, nothing like math related" and it "looked like a breath of fresh air" (Interview 2). Other students saw the course as an opportunity to explore an interest or passion not directly addressed in their regular disciplinary study. For instance, a student studying environmental geosciences explained, "I have a bit of an interest in like, ethics and activism, so it seems bit more up my street, and I liked how general it sounded" (Interview 3). This generality and interdisciplinarity impacted how or whether a leader emerged and could be identified in a group.

This troubled conceptualization of leadership can be demonstrated by comparing different perspectives as they apply to the same group. In one of the groups whose meetings were observed, a student, their coach, and the research team all recognize and address different types of leadership, revealing the dynamic and contingent nature of this elusive role. This is particularly evident when we compare one student's comments (Interview 1) with those of their coach (Interview 6), and our IDLab analysis of the group they were part of (see Figure 1). First, the student explains:

> Maybe [there was a leader] in different parts, like, it changed. So, depending on what we were doing, it would change. For example, there was one of the guys who had previous experience volunteering in a youth centre, so maybe for the parts that were researching those and getting more information he was the leader . . . when we filmed our video, there was a girl who had all the equipment and stuff so maybe for that part she was the leader.

This student aligns leadership with experience (volunteering in a youth centre) and implied specialism (having the video equipment and presumably being able to use it). Later, they also equate leadership with knowledge: "there were people that we allowed to kind of take charge a bit because we knew they were a bit more knowledgeable about what we were doing" (Interview 1). This account suggests that a leader emerged at key points in response to specific requirements of the project, consistent with the above-described team leadership model.

Second, the coach (Interview 6) characterizes the group dynamic as follows:

> When I observed them, my feeling was that, yes, there were two, well three students who perhaps spoke more frequently, or perhaps had a tendency to come out first saying something . . . I don't think there was a single leader in my group, absolutely not . . . I think there were two or three students who perhaps were more often taking a lead in the conversations I was part of.

The coach suggests a correlation between leadership and speaking first and often. Although by these measures one may expect that a single leader may emerge, the coach was resistant to this idea: "But they weren't leaders as such . . . everything was done in a process of negotiation." The coach seems to suggest here that leadership and negotiation are mutually exclusive.

Finally, based on the analysis produced in IDLab, leadership can be determined using multiple metrics. One key indicator is percentage of speaker contributions based on turns. In one observed meeting of this same group the coach was by far the most active speaker, and the students' contributions from least to most active were within a 7% range. This indicates a relatively even distribution of contributions across the student participants. It might be tempting to equate the proportion of speech contributions with leadership. However, it is important to understand the quality of speech contributions in this context as well. The coach notes frequency and being the first to speak as potential indicators of a leader. The below figure provides additional dimensions, prompting our team to query which types of speech we associate with leadership. Nevertheless, considering types of speech, or the content of what is being said, belies a different type of leadership than frequency. One can easily imagine someone who speaks rarely, but in a more directive (confident or prompt) mode being a leader.

Figure 1 provides a summary of ID Lab analysis, indicating the speech tags that were assigned to some speakers in the group. The coach is prompting the vast majority of the time they are speaking, which is in keeping with the intended function of this role. The student who contributed the least (S2) was equally "positive" and "unsure," both tags being responsive to ideas and suggestions from other group members. Given this mode and tags, it seems

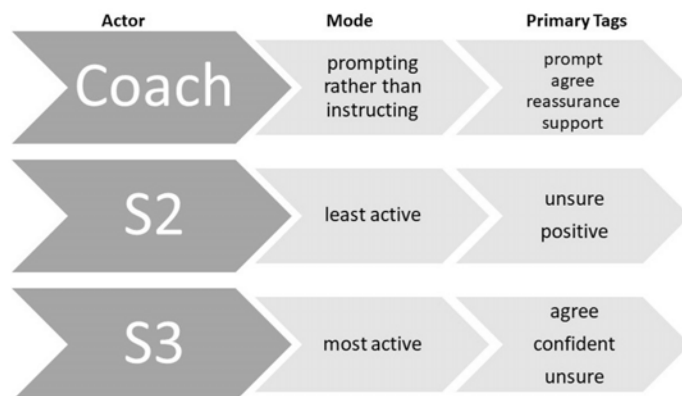

Figure 1. Speaker Mode and Primary Tags

reasonable to our team to suggest that this student was not in a leadership role. Conversely, the speech of the student who contributed the most (S3) was tagged "agree," "confident," and "unsure." This observation could be taken to imply leadership qualities in some contexts, but is not, in itself, sufficient to identify a leader.

The lack of a clear leader in both their coach and peers created some instability for students as they grappled with the posed problem. They described feeling confused about how to interpret the problem and which direction to take. For instance, one student explained, "there were four of us, and we had four really separate streams of consciousness about what to do, and we couldn't whittle it down" (Interview 1). By the end of the term working on interdisciplinary teams was a highlight for students as well; "It was one of my favourite parts of the course. All of us were from completely different degree programs. Maybe two were doing economics, others were doing psychology, history, and politics" (Interview 3). A coach (Interview 6) observed:

> The students themselves felt a very clear link to their own disciplines. I was actually surprised by how much they identified with their discipline of study; I was surprised that they had developed such a strong affiliation to their discipline. I think the discipline, disciplinary knowledge, background methodologies, and so on, played a role in how they approached their work, in the way they exchanged their views.

The following section will interrogate disciplinary perspectives on leadership, exploring how the varied disciplinary background of students, coaches, and our research team informed our findings.

Disciplinary Perspectives on Leadership

Many of the observations made by coaches about leadership in their groups seemed to be informed by their disciplinary training. A coach from a contemporary art and performance background described leadership as energetic and active, rather than passive. For example, they described a student who "wasn't ever going to be in a leadership role" because they had shut down and decided they were "just going to sit and listen" (Interview 4). Later in their interview the same coach explained:

> I think there are very many different leadership styles. It's like an analogy with theatre practice, because I can't help myself. It's that you sometimes have director led theatre where there's a director leading a room of actors, and you sometimes have devised theatre, where more often there's a group of people that share in authorship in some way. It's very rare that there isn't some kind of directorial role emerging from that. I think that's the case with these groups as well.

In contrast, we already discussed a coach (Interview 6) who identified a process of negotiation. It seems apparent that this coach, who is from history and literature, prioritises dialectic exchange. They explain, the leaders in the group "also made their voice heard, I think quite strongly and quite openly" (Interview 6). This sentiment was shared by another coach from a French and English literature background who explained that their group was led by two "male students who had slightly more dominant presence" and were "the first ones to kind of speak up, not necessarily always kind of raising a hand or anything, but just being sort of the first ones to offer opinions or voices," "they seemed to direct things quite quickly and quite naturally, and the team would just sort of follow them" (Interview 7).

An especially interesting perspective was offered by a student (Interview 8) studying social anthropology at the beginning of the term:

> I don't like the idea of anyone feeling like a leader because I think that they'll expect us to just follow them, or just depend on them to organize this and do that. I think that's quite like bad for group work because it makes bad power dynamics. I'm more than happy to take the lead on something, but I think we should have different things.

Later in the term the same student reflected on the role of coach, explaining, "Sometimes maybe this is just a bit lazy, but it's nice to have someone who's like an authority in the group that isn't part of the group, so it doesn't make the dynamic bad" (Interview 10). Then, in their reflective essay, this same student explained that once they had taken the lead on the project the "dynamic became hard to step away from," noting "it is possible that this is the result of 'Groupthink' (Hart, 1991).

A sociology student described the approach her group decided upon "to be as flat as possible" by "allocating a different leader every week" using a rota, as "a really new thing for me" (Interview 11). This student reflected that they were aware of their own leadership style (Interview 11):

> I can take on too much work. Maybe squish other people a little bit. Kind of not give people a chance. For me personally, it's a learning curve as well to still contribute and help without maybe overshadowing other people and making sure that they're in a space where they can lead in their way as well.

Our research team is also made up of a diverse set of scholars with various ontological and epistemological perspectives. Some of us are quantitatively adept while others are decidedly qualitative or critical; some have been trained in education as a discipline, while others are geoscientists or have training in gender studies and business management.

The analysis produced by IDLab gestures towards a set of potential assumptions about leadership that our team grappled with. Amongst the most obvious deductions to be made from the IDLab analysis is about speaker participation; the student who speaks the most could be understood as the

leader in the group. Such a conclusion rests upon the basic premise that leaders are distinguishable from their group by their level of activity and participation. Another discussion we had was about what types of speech a leader would engage in. Language tagged as "initiating" and "challenging" garnered interest from some members of our team who, perhaps, framed leadership in the realm of proactivity. Speaker interaction was taken as informative on the matter of leadership as well, with some researchers suggesting the leader might interact more judiciously with everyone present, including the coach. Still, others found it consistently more difficult to assign such roles.

Another variable that affected the research team's ability to reach consensus on leadership was the aforementioned flexibility of roles. This was highlighted when S1 noted that the leadership seemed to change depending on the task on hand. As researchers who had limited access to the entirety of group interaction, it was impossible for us to account for all the meetings (formal and informal) the group had outside of their coached session, as well as the various emails and group chats, that may have evidenced this fluidity. However, even in comparing sessions of the same group across the weeks, there is considerable variation in terms speaker participation, types of speech, and speaker interaction.

Figure 2 provides a simplified illustration of how students' engagement in uncoached meetings changed over the course of the semester. The figure demonstrates (1) how a group's dynamic may shift with increased comfortability, and (2) how a group's dynamic shifts in response to member attendance, as there was a student absent from the Month 3 meeting. On the whole, there was less diversity in speech type in the meeting in Month 1—all the students

Figure 2. Tag Use Over Time

are agreeing and supporting most often. This suggests an inability or hesitancy to argue or disagree given the early stage of the group's familiarity with each other and the tasks ahead of them. By Month 3, there was far more variance in types of speech, with new tags used like "information," "explanation," "checking," "suggestion," and "disagree."

In terms of leadership, some members of our research team would identify S1 as the leader based on their tagged speech in Figure 2 because they seem to be the only student providing new information, and they are consistently providing suggestions. However, in the Month 3 meeting other students seem more active in disagreeing and arguments. Perhaps the Month 3 meeting included some kind of struggle for leadership, or a decision being negotiated.

Despite our population of charts that imply positivist conclusions, the researchers each read the data differently and were struck by the role that task diversity, attendance, and temporality played in the meeting dynamic within a given group. Leaders emerged clearly in the minds of some researchers while others still struggled to make sense of what the IDLab analysis revealed in concrete terms, though undoubtedly there is much insight gained through its use, especially alongside other methods of data collection.

Interdisciplinary Leadership as a Temporal Sensibility

The IDLab analysis of meetings we were able to collect across the semester showed considerable variance in team dynamic week to week within a single group. One group clearly demonstrates a differentiation of contributions over several months of the project. Repeated group observations between January and March 2022 clearly shows one student (S1) dominating discussion. Using the reductive metric of number of turns taken this student might be assumed to have taken on a leadership role. For example, in one session around halfway through the semester, S1 took 68 turns in comparison with the lowest participating member at 18 turns. In fact, in post-course interviews, S1 identified another student (S3) as the group leader. S3 contributed almost the same amount as S1 but the quality of their contributions was somewhat different, including a similar level of agreement, but also offering support and useful suggestions that were affirmed and taken up by the rest of the group in turn.

In understanding this student's role, it has also been important to consider the sequence of speech contributions and our analysis indicates that S3 had relatively even exchanges with the other group members, indicating that their role was based on ongoing dialogue with all their collaborators. Taken together, the combination of relatively high proportion of turns, the quality of speech contributions, and the interactive nature of exchanges does seem to support S1's reflection on roles. This is corroborated by S3's reflective essay

submitted at the end of the course, in which they recognize their own leadership potential because of the project:

> I became the leader of sorts, with one member of our group jokingly declaring me "boss" in one of the tutorials. This was interesting to me, as I am the youngest member of our group and am typically quite reserved. However, this course and working in a group allowed me to realize what I am capable of and how I can come into a leadership role, despite those introverted characteristics.

While this example involves the gradual emergence of a leadership role for one student, both coaches and students in other groups have reported an absence of a clear leader figure. Often, this is accompanied by claims of a more equal or democratic power structure in which leadership is shared between group members. Some have also stated that there were no leaders. However, in response to the deferral of leadership that arises from the coaching model, one coach identifies the tendency for groups to find a "surrogate" for the role of the tutor as group leader:

> I think that however much the group ethos may be that they are going to work collaboratively and share responsibilities, a leadership figure often emerges. Part of that leadership style might be to devolve leadership, but I think that students, possibly in the absence of a more traditional tutor, look to the group to find a surrogate for that.

The process of group formation and organisation in SACHA might be understood as a gradual process of recognising and addressing the "initial shock" that results from an absence of leadership. Students look to the course leader, coaches, and external partner to provide clear definitions and direction. When this is not forthcoming, a period of adjustment takes place in which expectations, relationships and, as we have discussed elsewhere, emotions have to be managed, formed and acknowledged. It is therefore important to recognise that leadership strategies emerge from a disrupted, precarious, and challenging team dynamics.

This phenomenon was similarly reported upon by students we interviewed. At the beginning of the term, a group had lengthy discussions about how to manage roles, deciding upon a highly structured mode. A student from the group explained, "So we've got a rota base going like OK, you know person one is in charge of week one, person two is in charge of week two so that we all get a turn to step up so that the workload is also a little bit more evenly distributed" (Interview 11). However, when the same student was interviewed again at the end of the term, they explained that although the rota worked quite well, "When there's the pressure of a deadline, some people have to step up and take the lead a little bit. And the Team Charter kind of goes out the window" (Interview 13).

As the students develop modes of working together that allow them to progress the project towards completion, leadership can be understood as a process of stabilisation in which the group tries out, experiments with, and rehearses different ways of organising themselves and distributing tasks and responsibilities. This continues throughout the course, and it is not always (or even often) the case that a clear leadership figure emerges. This suggests that interdisciplinary leadership might be considered emergent and varied, where different styles are explored and experimented with. That is, leadership is a temporal sensibility that "are found in context and in relationship", they "are lived out" (Giles, Bills, Otero, 2015; p. 746).

Conclusion

This research has provided novel empirical evidence for the myriad of ways in which leadership is conceptualized and understood by students, coaches, and researchers in an interdisciplinary, challenge-based learning environment. Rather than attempting to apply well-established, and often useful, theories of leadership we sought to expose the nuanced context of teamwork that is fluid, responsive, and temporarily and contextually informed.

In practice, students, educators, and researchers may interrogate the assumptions they hold about leadership, and whether they make sense in interdisciplinary education. We suggest that static concepts of leadership, especially if applied in any role designation for example, are insufficient for the reality of the interdisciplinary challenge-based classroom where leadership is in flux and dependent on a variety of factors including immediate task at hand, coach presence, familiarity and comfortability of group, and attendance of group members. Therefore, educators should resist the desire to fix identities amongst the groups or teams they facilitate, allowing students to benefit from the full fluidity of problem solving and project work as a team. We hope that our demonstrable use of IDLab, which is open source and available for use, will encourage others, especially those interested in group dynamics in interdisciplinary settings to take it up as a reflective or triangulating measure.

Our work also contributes to theorization of leadership in the interdisciplinary challenge-based classroom. Theories of leadership ought to evolve as pedagogical approaches continue to respond to a changing world, especially in the context of technology like large language models and AI. The temporality of leadership our work points towards may be especially useful in making sense of learning settings where technology (amongst other things) is understood as agentic. Therefore, as pedagogy adapts, we suspect our methodology and theorization of leadership to become increasingly salient.

Acknowledgements

We wish to thank our colleagues Seongsook Choi and Andy Cross for their contributions to the Crossing the Line research project. This research is funded by Edinburgh Futures Institute and the Principal's Teaching Award Scheme at the University of Edinburgh.

Biographical Notes

M. Winter, PhD, is a research fellow at the Moray House School of Education and Sport at the University of Edinburgh, where she works on the project: "Crossing the Line: Developing an Interdisciplinary Toolkit for Higher Education." Her general research interests include gender, technology, work, and pedagogy.

David Overend, PhD, is a Lecturer in Interdisciplinary Studies at Moray House School of Education and Sport at the University of Edinburgh. He is Director of the MA(Hons) Interdisciplinary Futures at Edinburgh Futures Institute, where he leads courses on Researching Global Challenges and Creating Edinburgh: The Interdisciplinary City. David researches interdisciplinary education as well as contemporary art and performance. He is the author of *Performance in the Field: Interdisciplinary Practice-as-Research* (Palgrave Macmillan 2023).

References

Allen, K. E., & Cherrey, C. (2000). *Systemic leadership: Enriching the meaning of our work* (Vol. 7). University Press of America.

Antonakis, J. E., Cianciolo, A. T., & Sternberg, R. J. (2004). *The nature of leadership*. Sage.

Avolio, B. J., & Gardner, W. L. (2005). Authentic leadership development: Getting to the root of positive forms of leadership. *The Leadership Quarterly*, *16*(3), 315–338.

Aymoldanovna, A. A., Zhetpisbaeva, B. A., Kozybaevna, K. U., & Kadirovna, S. M. (2015). Leadership development of university students in the activities of student government. *Procedia-Social and Behavioral Sciences*, *197*, 2131–2136.

Bass, B. M., & Stogdill, R. M. (1990). *Bass & Stogdill's handbook of leadership: Theory, research, and managerial applications*. Simon and Schuster.

Bayless, D. J., & Robe, T. R. (2010, October). Leadership education for engineering students. In *2010 IEEE Frontiers in Education Conference (FIE)* (pp. S2J-1). IEEE.

Bennis, W., & Nanus, B. (1985). Leaders: The strategies for taking. Harper & Row.

Biehl-Missal, B. (2010). Hero takes a fall: A lesson from theatre for leadership. *Leadership*, *6*(3), 279–294.

Bierema, L. L. (2016). Women's leadership: Troubling notions of the "ideal" (male) leader. *Advances in Developing Human Resources*, *18*(2), 119–136.

Bogotch, I., Beachum, F., Blount, J., Brooks, J., & English, F. (2008). *Radicalizing educational leadership: Dimensions of social justice* (Vol. 2). Brill.

Burns, J. (1978). *Leadership*. Harper & Row.

Carmichael, T., & LaPierre, Y. (2014). Interdisciplinary learning works: The results of a comprehensive assessment of students and student learning outcomes in an integrative learning community. *Issues in Interdisciplinary Studies*, *32*, 53–78.

Caza, A., & Rosch, D. M. (2014). An exploratory examination of students' pre-existing beliefs about leadership. *Studies in Higher Education*, *39*(9), 1586–1598.

Channing, J. (2020). How can leadership be taught? Implications for leadership educators. *International Journal of Educational Leadership Preparation*, *15*(1), 134–148.

Choi, S. (2016). The case for open source software: The interactional discourse lab. *Applied Linguistics*, *37*(1), 100–120.

Cinque, M. (2016). "Lost in translation": Soft skills development in European countries. *Tuning Journal for Higher Education*, *3*(2), 389–427.

Crosby, B. C. (2016). *Teaching leadership: An integrative approach*. Routledge.

Crosier, D., Horvath, A., Kerpanova, V., Kocanova, D., & Riihelainen, J. (2015). Modernisation of higher education in Europe: Access, retention and employability. Eurydice Brief. *Education, Audiovisual and Culture Executive Agency, European Commission*.

Daley, J., & Baruah, B. (2021). Leadership skills development among engineering students in Higher Education: An analysis of the Russell Group universities in the UK. *European Journal of Engineering Education*, *46*(4), 528–556.

DeRue, D. S., Sitkin, S. B., & Podolny, J. M. (2011). From the guest editors: Teaching leadership—Issues and insights. *Academy of Management Learning & Education*, *10*(3), 369–372.

Doh, J. P. (2003). Can leadership be taught? Perspectives from management educators. *Academy of Management Learning & Education*, *2*(1), 54–67.

Dugan, J. P., & Komives, S. R. (2007). *Developing leadership capacity in college students*. National Clearinghouse for Leadership Programs, College Park, MD.

Dugan, J. P., & Komives, S. R. (2010). Influences on college students' capacities for socially responsible leadership. *Journal of College Student Development*, *51*(5), 525–549.

IIS_41-2_2P.indd 96 7/10/24 6:30 AM

Elmuti, D., Minnis, W., & Abebe, M. (2005). Does education have a role in developing leadership skills? *Management Decision*, *43*(7/8), 1018–1031.

Ernest, S. (2003, August 20–24). *Gender, power and leadership: Perspectives from figurational sociology* [Conference presentation]. Gender and Power in the New Europe, the 5th European Feminist Research Conference, Lund University, Sweden.

European Commission. (2012). *Rethinking education strategy: Investing in skills for better socio-economic outcomes*. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52012DC0669

Farr, J. V., Walesh, S. G., & Forsythe, G. B. (1997). Leadership development for engineering managers. *Journal of Management in Engineering*, *13*(4), 38–41.

Garfield, Z. H., Syme, K. L., & Hagen, E. H. (2020). Universal and variable leadership dimensions across human societies. *Evolution and Human Behavior*, *41*(5), 397–414.

Giles, D. L., Bills, A. & Otero, G. (2015). Pedagogical approaches for developing relational sensibilities in educational leaders, *Reflective Practice*, *16*(6), 744–752.

Greenleaf, R. K. (2002). *Servant leadership: A journey into the nature of legitimate power and greatness*. Paulist Press.

Greenleaf, R. K. (2008). *The servant as leader*. Greenleaf Center for Servant Leadership.

Gunter, H. (2010). A sociological approach to educational leadership. *British Journal of Sociology of Education*, *31*(4), 519–527.

Haber, P. (2011a). Formal leadership program models. In S. R. Komives, J. P. Dugan, J. E. Owen, C. Slack & W. Wagner (Eds.), *The handbook for student leadership development* (2nd ed., pp. 231–258). Jossey-Bass.

Haber, P. (2011b). Perceptions of leadership: An analysis of college students' understandings of the concept of leadership. *Journal of Leadership Education*, *11*(2), 26–51.

Hamid, S.F.A., Mohamed, M. (2016). Experiential learning in the wilderness: Outdoor education program toward enhancing college students' leadership practices. In C. Fook, G. Sidhu, S. Narasuman, L. Fong, S. Abdul Rahman, (Eds.) *7th International Conference on University Learning and Teaching (InCULT 2014) Proceedings*. Springer. https://doi.org/10.1007/978-981-287-664-5_41

Heifetz, R. A., Heifetz, R., Grashow, A., & Linsky, M. (2009). *The practice of adaptive leadership: Tools and tactics for changing your organization and the world*. Harvard Business Press.

Ivashchenko, O., Yarmak, O., Galan, Y., Nakonechnyi, I., & Zoriy, Y. (2017). Leadership as a fundamental aspect of the performance of student-athletes in university men's sports teams, *Journal of Physical Education and Sport*, *17*(1), 472–480.

Jenkins, D. M., & Endersby, L. (2019). Leadership education: Illuminating a community of practice. *New Directions for Student Leadership*, *164*, 123–139.

Katz, R. L. (1955). Skills of an effective administrator. *Harvard Business Review, 33*(1), 33–42.

Katz-Buonincontro, J. (2011). Improvisational theatre as public pedagogy: A case study of "aesthetic" pedagogy in leadership development. *Policy Futures in Education*, *9*(6), 769–779.

Kellerman, B. (2008). How followers are creating change and changing leaders. *Harvard Business School*.

Komives, S. R., Lucas, N., & McMahon, T. R. (2009). *Exploring leadership: For college students who want to make a difference*. John Wiley & Sons.

Kuh, G. D. (2008). Why integration and engagement are essential to effective educational practice in the twenty-first century. *Peer Review*, *10*(4), 27–29.

Landis, E. A., Hill, D., & Harvey, M. R. (2014). A synthesis of leadership theories and styles. *Journal of Management Policy and Practice*, *15*(2), 97.

McCullagh, S., & Ford, C. (2018). The desert below: The labyrinth of sensibility between Rancière, Deleuze, and Weil. *Journal of Aesthetics and Phenomenology*, *5*(2), 157–173.

Morrison, T., Maciejewski, B., Giffi, C., DeRocco, E. S., McNelly, J., & Carrick, G. (2011). Boiling point? The skills gap in US manufacturing. *Deloitte and the Manufacturing Institute*. Deloitte Development LLC.

Mourshed, M., Patel, J., & Suder, K. (2014). Education to employment: Getting Europe's youth into work. McKinsey & Company.

Northouse, P. G. (2007). *Leadership theory and practice*. 4th ed. Sage.

Okudan, G. E., & Rzasa, S. E. (2006). A project-based approach to entrepreneurial leadership education. *Technovation*, *26*(2), 195–210.

Ornellas, A., Falkner, K., & Edman Stålbrandt, E. (2019). Enhancing graduates' employability skills through authentic learning approaches. *Higher education, skills and work-based learning*, *9*(1), 107–120.

Petre, G. (2020). Developing students' leadership skills through cooperative learning: An action research case study. *International Forum*, *23*(2), 143–162.

Quaye, S. J., Harper, S. R., & Pendakur, S. L. (Eds.). (2019). *Student engagement in higher education: Theoretical perspectives and practical approaches for diverse populations*. Routledge.

Rost, J. C. (1991). *Leadership for the twenty-first century*. Greenwood Publishing Group.

Senge, P. M. (2006). *The fifth discipline: The art and practice of the learning organization*. Broadway Business.

Senge, P., Hamilton, H., & Kania, J. (2015). The dawn of system leadership. *Stanford Social Innovation Review*, *13*(1), 27–33.

Shakeel, F., Kruyen, P. M., & Van Thiel, S. (2019). Ethical leadership as process: A conceptual proposition. *Public Integrity*, *21*(6), 613–624.

Skalicky, J., Warr Pedersen, K., van der Meer, J., Fuglsang, S., Dawson, P., & Stewart, S. (2020). A framework for developing and supporting student leadership in higher education. *Studies in Higher Education*, *45*(1), 100–116.

Stephen, J. S., & Rockinson-Szapkiw, A. J. (2021). A high-impact practice for online students: The use of a first-semester seminar course to promote self-regulation, self-direction, online learning self-efficacy. *Smart Learning Environments*, *8*(1), 6.

Students Organising For Sustainability United Kingdom. (2022). *Students' as change agents (SACHA) coaches survey*.

Taatila, V. P. (2010). Learning entrepreneurship in higher education. *Education+ training*. *52*(1), 48–61.

Thornhill-Miller, B., Camarda, A., Mercier, M., Burkhardt, J. M., Morisseau, T., Bourgeois-Bougrine, S., Vinchon, F., Hayek, S., Augereau-Landais, M., Mourey, F., Feybesse, C., Sundquist, & Lubart, T. (2023). Creativity, Critical Thinking, Communication, and Collaboration: Assessment, Certification, and Promotion of 21st Century Skills for the Future of Work and Education. *Journal of Intelligence*, *11*(3), 54.

Uhl-Bien, M., Marion, R., & McKelvey, B. (2007). Complexity leadership theory: Shifting leadership from the industrial age to the knowledge era. *The leadership quarterly*, *18*(4), 298–318.

University of Edinburgh. (2022). *Course catalogue: Students as change agents*. http://www.drps.ed.ac.uk/22-23/dpt/cxefieo8003.htm.

University of Edinburgh. (2019). *Careers service briefing: Future of work report and update*. https://www.ed.ac.uk/sites/default/files/atoms/files/careers_service_briefing_-_future_of_work.pdf

Van Nieuwerburgh, C. (2018). Coaching in education: An overview. In C. Van Nieuwerburgh (Ed.), *Coaching in education: Getting better results for students, educators, and parents* (pp. 3–23). Routledge.

Viviani, L. (2017). A political sociology of populism and leadership. *Società MutamentoPolitica*, *8*(15), 279–304.

Wiborg, E. R. (2022). Troubling the niceness of social change in leadership education. *Journal of Leadership Studies*. *16*(3), 51–56.

Zaccaro, S. J., Rittman, A. L., & Marks, M. A. (2001). Team leadership. *The Leadership Quarterly*, *12*(4), 451–483.