

Learning Ecosystems

Forging Stakeholder Partnerships to Fuel Optimal Advanced Distributed Learning Practices

David A. Rude

University of Louisville

Abstract

This article reflects a recent case study focused on creating a new learning ecosystem for microelectronics workforce development. In broad terms, this case study shed light on appreciating the critical need for learning ecosystems. For context, the need to attend to developing a robust and sustainable microelectronics workforce was fueled by creating, expanding, and nurturing continually learning partnerships among academia, industry, and government. Central to these learning partnerships was analyzing individual stakeholder needs, appreciating the unique contributions of stakeholders, and designing mutually beneficial learning solutions that built and fortified the ecosystem. Scholar and practitioner foundations are crucial for building and sustaining learning partnerships. The article shares best practices such as gathering and analyzing stakeholders, discerning intended value, and maturing the ecosystem. These practices can drive effective and learning-centric solutions that address complex issues facing our defense industrial base. Benefits to distributed learning include focusing prominently on the criticality of upfront and thoughtful analyses.

This best-practices article emanated from a session presented at the 16–18 August 2022 Federal e-Learning Science & Technology (iFEST) Conference in Alexandria, Virginia. The iFEST Conference theme, “New Paradigm of Learning: Partner and Prevail,” was well-suited for exploring the learning ecosystem phenomenon in the context of microelectronics workforce development (Rude, 2022).¹ Sponsored by the Advanced Distributed Learning (ADL) network, iFEST en-

abled a thoughtful discussion on myriad partnering initiatives in the learning space. This article provides context for a learning ecosystem forged to address microelectronics, a national security concern. Then, social constructivism—the theoretical basis for this article—is addressed. Lastly, best practices concentrating on learning ecosystem stakeholders are explored.

Microelectronics Workforce Development Case Study

Developing the microelectronics workforce (ME WFD) is the case study that sparked the conference presentation and best practices addressed herein. The workforce is vast; according to the Semiconductor Industry Association (2021), “The U.S. semiconductor industry accounts for over a quarter of a million direct U.S. jobs and nearly 1.6 million additional indirect and induced U.S. jobs” (p. 21). Codified statute focuses on ME WFD activities such as experiential learning (Microelectronics Workforce Development Activities, 2022). The National Science and Technology Council (2022) issued a report in October 2022 that proffered two ecosystem-salient recommendations, “modernize career and technical education and ... expand and disseminate new learning technologies and practices” (p. 13). A recurring theme is the need to reshore semiconductor capabilities and develop the industry’s workforce, as cited by Shivakumar et al. (2022). The resultant ME WFD learning ecosystem was also coalesced to address a lack of diversity and educational opportunities in the larger science, technology, engineering, and mathematics (STEM) terrain. Data provided by the National Science Board (2022) yields disproportionate representation of minorities in STEM-related bachelor’s and graduate degree programs. For instance, although Hispanics comprise 21.3% of the U.S. population aged 20–34, that demographic constitutes only 16.3% of bachelor’s degree recipients, 12.3% of master’s degree recipients, and 8.4% of doctoral degree recipients.

In several ways, the ME WFD learning ecosystem’s evolution parallels the observation made by Walcutt and Schatz (2019): the imperative for an ecosystem orientation—one that harnesses the tremendous potential of its individual members and the collective—is fueled by the vast learning landscape, “now encompassing the full spectrum of formal, informal, and experiential training, education, and development” (p. 3). In that vein, Walcutt and Schatz (2019) portend that to an increasingly pervasive degree, learning demands competence in creating effective interdependencies, complexity, systems thinking, partnering, and collaborations. Engler and Pritzker (2018) recommended a reconfigured learning landscape, one that forges robust connections between education and employment. Educational venues were not limited to degree-granting institutions; vocational and trade schools that confer credentials were encouraged, as was the increased quality and transparency of cre-



denial programs. This research illuminated the need to broaden the aperture of educational stakeholders involved in ME WFD.

Another parallel related to ME WFD ecosystem stakeholders draws from the ADL initiative, authorized by the Department of Defense (DOD) Instruction 1322.26, *Distributed Learning* (Kurta, 2017). As noted therein, the policy refers to imperatives such as the following:

- DOD personnel having access to contemporary, economical, effective, and accessible learning opportunities;
- DL should be considered as a learning intervention solution;
- DL capabilities will leverage interoperability; and
- DL will be shared throughout DOD. (Kurta, 2017)

These policy mandates undergird the need for learning ecosystems comprised of expert and diverse stakeholders throughout the DOD's vast enterprise. Distributed learning can help solve the nation's myriad national defense challenges. The ADL initiative itself is led by a network of advisors called the Defense Advanced Distributed Learning Advisory Committee (DADLAC). The DADLAC, comprised of the DOD's distributed learning ambassadors from the DOD's components, should be leveraged to champion stakeholder ecosystems and their value.

Social Constructivism Theory

Learning ecosystems and their individual stakeholder components emanate from social constructivism theory. Adults learn in a sociocultural context. In this article, best practices for learning ecosystem design and sustainment are viewed through a social constructivist lens, which centers on “how people make sense of their experience” (Merriam et al., 2007, p. 291). Ecosystems are a microcosm of that sociocultural orientation in that they amalgamate perspectives, orientations, thoughts, and emotions needed to construct a learning intervention. Basing ecosystems on social constructivism promotes the construction of knowledge “when individuals engage socially in talk and activity about shared problems or tasks” (Merriam et al., 2007, p. 291). Learning ecosystems follow the constructivist's focus on experiences, reflection, communities of practice, and situated learning. Seminal works such as Dewey

Dr. Dave Rude is the chief learning officer for Longenecker and Associates (L&A), and serves as partner faculty at the University of Louisville. Prior to joining L&A, Rude was the chief learning officer for Parallax Advanced Research Corporation, the Department of Defense's civilian workforce, and the U.S. National Nuclear Security Administration. Rude has an EdD from George Washington University, an MPA from American University, and a BS in business administration from George Mason University. He is a certified professional in talent development and a certified action learning coach.



(1916), Illeris (2011), Lave and Wenger (1991), and Lindeman (1961) make indelible contributions to these focus areas. As Dewey (1916) observes, “Any education given by a group tends to socialize its members, but the quality and value of the socialization depends upon the habits and aims of the group” (pp. 95–96). Groups must promote “mutual interest” and “freer interaction” (p. 100) to achieve the pragmatic and socially constructed ideals that Dewey promotes.

Ecosystems are themselves an educational collective in which mutual interests and socialization occur. As Lindeman (1961) notes, collective life becomes an educational experience when social function methods that promote different perspectives and creativity are expressed. Collective functioning enables intelligent contemplation on questions such as “What further information do I need concerning the various aspects of the impeding environment?” (Lindeman, 1961, p. 116). To that end, the workplace is one such learning space. Illeris (2007) offers advice that extends to ecosystems: “Educational institutions and workplaces must ... see each other as partners in a common project that aims at creating relevant competence development for employees” (p. 122).

Constructivism-based collaborative inquiry—“a process consisting of repeated episodes of reflection and action through which a group of peers strives to answer a question of importance to them” (Bray et al., 2000, pp. 6–7)—highlights interactions with people and promotes diversity of thought. Situated learning yields legitimate peripheral participation, “engagement in social practice that entails learning as the integral constituent” (Lave & Wenger, 1991, p. 35). Moreover, “identities [are] long-term living relations between persons and their place and participation in communities of practice” (Lave & Wenger, 1991, p. 53). For ecosystems, “a learning curriculum unfolds in opportunities for engagement and practice ... it is the characteristic of a community” (Lave & Wenger, 1991, pp. 93, 97). The ecosystem itself is a diverse learning construct.

Related theories and models were borne from social constructivism to include the triple helix model (Etzkowitz & Leydesdorff, 2000) and agile instructional systems design (Training Industry, n.d.). Etzkowitz and Leydesdorff (2000) propose an empirical triple helix program to facilitate exchanges between government, industry, and academia. These exchanges were to fuel healthy relationships and feedback between the participating institutions.

In building on the legacy Analysis/Design/Develop/Implement/Evaluate paradigm, which has been a staple of instructional systems (curriculum) development for decades (Hodell, 2011), the agile learning design model likewise confers the criticality of analysis in the service of speed, flexibility, and collaboration (Training Industry, n.d.). The agile learning design tenets amplify frequent and point-of-need collaborations with stakeholders. Within the learning design context, stakeholders can serve as subject-matter experts “to check that the content is correct and clear” (Hodell, 2011, p. 71).



Agility, inquiry, and collaborations relate to the research and practice of action learning which draws heavily on social constructivism. Action learning involves a group of stakeholders who work through real world and crucial business imperatives (Marquardt, 2004; Robertson & Hekcroodt, 2022). The “wicked” problems that confront action learning involve stakeholders, “each of whom too has their own legitimate role, perceptions, aims, intentions, feelings, and skills with relation to the ‘common’ problem. ... It is essential to involve all stakeholders—or representatives in all of them—in tackling the issue *together*” (Boydell, 2022, p. 193). Boydell describes stakeholder dynamics that include power, influence, differences of perception and opinion, and triaging priorities. Interventions such as problem network analysis are related closely to the stakeholder analysis framework discussed in the next section.

Stakeholder Analysis and Related Imperatives

The previous sections characterized the drivers for the ME WFD learning ecosystem and situated it in the social constructivism theory. Attention now turns to stakeholders that comprise the ecosystem. For purposes of this article, a *stakeholder* is anyone or any entity who is influenced by or could influence you and/or your project. A *stakeholder analysis* is the process of understanding the motives, power base, alliances, goals, etc., of each stakeholder.

Attributes of effective stakeholder relationships and dynamics must be considered as contributing factors to stakeholder analyses and as antecedents to value-added partnerships formed and sustained in a collective entity (e.g., ecosystem). A best practice draws from Marquardt (2011), who offers that great value for a learning culture can be derived when there is “collaborative creativity in all contexts, relationships, and experiences, and the measure of success is the combined wisdom and synergy” (p. 68). Ecosystems can promote a “we” culture because of the collective and purpose-centric orientation (Pink, 2009). This is an essential driver; as Pink (2009) offers, purpose, when coupled with autonomy and mastery, can harness powerful and productive motivations.

Change agents can be effective, powerful, purpose-centric motivations for network partners. These change agents “are typically partners and stewards who have a strong sense of ownership and commitment to success” (Rosenfeld et al., 2001, p. 50). Contemporary work environments are dependent on networks of a dynamic suite of agile teams (Carboni et al., 2021). Those agile-fused ecosystems are predicated on connections “with precision and intentionality” (Carboni et al., 2021, p. 6). Dynamic and fluid ecosystems should concentrate on factors to include shaping the nature of the work, stimulating innovation (Rosenfeld et al., 2001), teaming, engagements, and streamlined practices. In addition to consider-



ation, stakeholders must be engaged and with a rich source of collaboration for designing and executing learning projects. Individual stakeholders can be assets or liabilities. Wehrung (2020) advises that learning practitioners take a conservative approach at the outset to obtain buy-in and effective partnering. Russ-Eft and Preskill (2009) offer that “involving stakeholders provide opportunities for ensuring all voices are heard” (p. 477), which promotes an egalitarian and inclusive feedback environment and, in turn, a reinforcement of each stakeholder’s contributions.

Stakeholder equities and role clarity matter. Identify, list, and prioritize stakeholders (power and interest grid). Make the investment to understand stakeholder equities (Wehrung, 2020). Adults must appreciate and grasp the reasons for learning something (Knowles, 1984). In a similar vein, stakeholders need to know why they should be involved. McElroy et al. (2020) urge using a Responsible/Accountable/Consulted/Informed approach to classify stakeholders and delineate roles. Stakeholder interests and power should be visualized. Build and sustain robust connections throughout the learning ecosystem. Conduct an organizational network analysis.

Although stakeholders can be considered collectively as a group of members with equities in a learning project, the stakeholders themselves are not homogeneous (Sleezer et al., 2014). There can be substantially varying degrees of congruence (or divergence) when comparing the needs and interests of one stakeholder vis-à-vis another. Giattino and Stafford (2019) note, “The learning ecosystem concept necessarily involves many diverse components, likely derived from different vendors, across organizational boundaries, and for different phases and aspects of learning” (p. 319). Sleezer et al. (2014) outline eight discrete world views and how each lens manifests in terms of stakeholder actions and perceptions. These perspectives underscore the importance of understanding stakeholders and attending to their agendas. Just because stakeholders have coalesced around a common learning project does not mean what drove their interest or what would satisfy their own objectives are similar. The type of needs assessment, which, according to Sleezer et al. (2014), encompasses knowledge/skills, job/task, competency-based, strategic, and complex, must also be factored into the stakeholder analysis since each type has a different focus.

Stakeholder engagement is another important factor. Relevant andragogical (Knowles, 1984) concepts include readiness, problem-centered orientation, and intrinsic motivation. For instance, to what degree is an individual stakeholder ready? Is there buy-in, and how do you know? What motivates the stakeholder? Is there consensus on the terminal learning outcomes for the project? In a similar vein, Williams et al. (2022) situate a conceptual and theory-building model of innovation and leadership. The fifth and ultimate level of the model’s hierarchy is creative engagement, which the authors define as “the creation of novel and



Table
Give and Get Activity

Stakeholder	Give		Get	
	Will Provide	To Whom	Needs (describe)	Who Will Provide
You				
A				
B				
N				

useful solutions, across the spectrum from incremental to radical, that engage the cognitive, emotional, and behavioral energy of individuals working alone or in groups” (Williams et al., 2022, p. 8). These creative engagements can serve as useful catalysts for thriving learning ecosystems.

Best Practices

The best practices are offered in three tracks: (1) forming the stakeholder ecosystem, (2) assessing stakeholder relationship health, and (3) maintaining stakeholder networks.

Forming the Stakeholder Ecosystem

There are different techniques for network establishment. A simple yet highly effective implement is a “give and get” activity. This tool can surface motivations and energy toward ecosystem participation. The “give” is what a stakeholder member will contribute (and add value to) the collective. The “get” is what a stakeholder needs from the ecosystem (or individual stakeholder members) to join, stay engaged, and gauge the ecosystem investment as worthwhile. For a sample, see the Table.

As a companion to the table, there is a series of questions that stakeholders should consider in the ecosystem context. Exploring these queries can aid in getting to know the stakeholders, acclimating individual parties into the ecosys-



Figure 1
Stakeholder Acclimation Questions



tem, and understanding power, influence, and motivational attributes. Figure 1 illustrates these questions (Rude, 2022).

Stakeholder Health Analysis

Once stakeholders join, attention must turn to sustainment. Assessing stakeholder health is vital to ecosystem relevance and vibrance. At this juncture, network mapping can serve as a useful visual to discern degrees of health using categories such as healthy, mixed bag, new, or dysfunctional. An example is shown in Figure 2. It begins with you in the middle and builds out from there.

Once the map is drawn, reflect on its findings. As offered by Deszca et al. (2020); Roberston and Hekcroodt (2022); and Rude (2022), consider some questions:

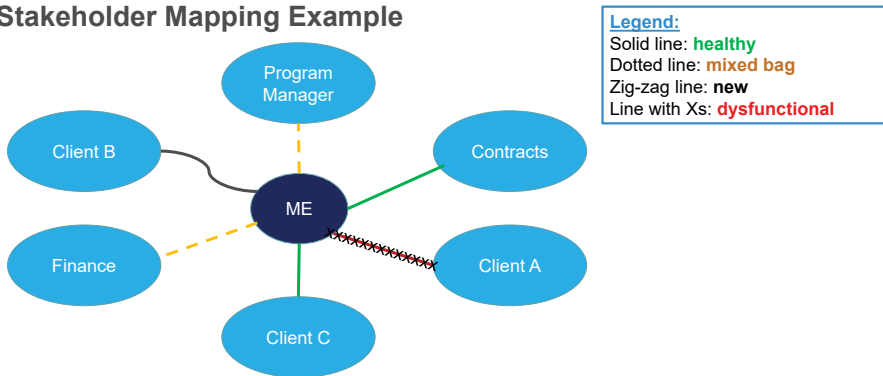
For those relationships that are **healthy**, what makes them so? How did that come about?

- For those that are a **mixed bag**, what can be done to get them to a healthier state?



Figure 2
Stakeholder Mapping

Stakeholder Mapping Example



Stakeholders can vary so please adapt this example to meet your environment

- For those that are **new**, how can that relationship be built, and trust and credibility promoted?
- For those that are **dysfunctional**, what are initial thoughts about how to fix that?
- How will stakeholders work on this distributed learning opportunity?
- What are the goals? Rules of engagement?
- Are you reflecting, listening actively, respecting, and appreciating diverse contributions?
- Who are the enablers? Resisters?

Maintaining Stakeholder Networks

Ecosystems such as those in a distributed learning context may be established to align with long-term vision and strategies. As living organisms, ecosystems are dynamic in nature. Individual stakeholders will enter and exit, and over time, their contributions may shift. To that end, what changes have you observed? Mavo-Navarro (2022) encourages that the person assigned to be the project sponsor discuss stakeholder attitudes (positive or negative), while roles, power, and influence be monitored routinely. Also, the project sponsor should determine issue taxonomy (objectives, roles/responsibilities, communication protocols). Stakeholder relationship principles should be founded on ongoing transparency and



Figure 3*Constructing and Sustaining Ecosystems to Partner and Prevail*

frequent, effective communications. Get short-term wins. Attend to relationships that can suffer. Focus on schedule, cost, performance, scope, and risk mitigation (Mavo-Navarro, 2022).

Summary

Figure 3 illustrates a roadmap for thinking about how, for instance, distributed learning ecosystems can partner and prevail (Rude, 2022).


Conclusion

As noted by Marquardt (2011), immense value for a learning culture can be derived when there is “collaborative creativity in all contexts, relationships, and experiences, and the measure of success is the combined wisdom and synergy” (p. 68). To that end, the social constructivism foundation and best practices informed by lived experiences in shaping the ME WFD learning ecosystems are offered as insights for harnessing the collective potential of stakeholders in the military learning, distributed learning, and related environments. Brief implications for research, theory, and practice in a military learning milieu include the following:



Implications for Research. As discussed, social constructivism theory posits that adults learn in a collective orientation. This portends further research as learning continues to evolve in and with the metaverse (including augmented and virtual reality, and artificial intelligence) and human-machine teaming. The military has a longstanding use of, for instance, simulations—a form of virtual reality—in training pilots. Gamification and other learning modalities in the metaverse space could benefit from exploring social constructivism from a research perspective.

Implications for Theory. This article advances another frontier in which social constructivism and related adult learning theories concentrate on collective learning. Military learning doctrine, such as that espoused in Chairman of the Joint Chiefs of Staff Instruction (Vanherck) 1800.01F which issues Joint Professional Military Education (JPME) policy for “students, faculty, delivery modes, and the educational requirements for Joint Officer Management” (Vanherck, 2020, A-1) across the military departments. Social constructivism should be promoted as a useful theoretical foundation for JPME curriculum.

Implications for Practice. As McChrystal (2015) noted, “the speed and interdependence of the modern environment create complexity” (p. 245). Through an interconnected social network showcased in this best practices article, military learning that focuses on socially constructed performance objectives can become a force multiplier for achieving complex warfighter mission success. 

References

- Boydell, T. (2022) Relational action learning. *Action Learning: Research and Practice*, 19(2), 193–195. <https://doi.org/10.1080/14767333.2022.2082820>
- Bray, J. N., Lee, J., Smith, L. L., & Yorks, L. (2000). *Collaborative inquiry in practice*. Sage.
- Deszca, G., Ingols, C., & Cawsey, T. F. (2020). *Organizational change* (4th ed.). Sage.
- Dewey, J. (1916). *Democracy and education*. Macmillan.
- Engler, J., & Pritzker, P. (2018). *The work ahead: Machines, skills, and U.S. leadership in the twenty-first century* (Independent Task Force Report No. 76). Council on Foreign Relations.
- Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: From national systems and “Mode 2” to a triple helix of university–industry–government relations. *Research Policy*, 29(2), 109–123. [https://doi.org/10.1016/S0048-7333\(99\)00055-4](https://doi.org/10.1016/S0048-7333(99)00055-4)
- Giattino, T., & Stafford, M. (2019). Governance for learning ecosystems. In J. J. Walcutt & S. Schatz (Eds.), *Modernizing learning: Building the future learning ecosystem* (pp. 317–337). U.S. Government Publishing Office.
- Hodell, C. (2011). *1SD from the ground up* (3rd ed.). ATD Press.
- Illeris, K. (2011). *The fundamentals of workplace learning*. Routledge.
- Knowles, M. S. (1984). *Andragogy in action: Applying modern principles of adult learning*. Jossey-Bass.



- Kurta, A. M. (2017). *Distributed learning (DL)* (Department of Defense Instruction 1322.26). U.S. Department of Defense.
- Lave, J., & Wenger, E. (1991). *Situated learning*. Cambridge University Press.
- Lindeman, E. C. (1961). *The meaning of adult education*. Harvest House.
- Marquardt, M. J. (2004). *Optimizing the power of action learning*. Davies-Black.
- Marquardt, M. J. (2011). *Building the learning organization* (3rd ed.). Nicholas Brealey.
- Mavo-Navarro, J. (2022, August 1). *Bring stakeholders into alignment*. Association for Talent Development. <https://www.td.org/magazines/td-magazine/bring-stakeholders-into-alignment>
- McChrystal, S. (2015). *Team of teams: New rules of engagement for a complex world*. Portfolio/Penguin.
- McElroy, B., Hutchinson, R., Isensee, E., McGrath, D. (2020). The impact of coalitions. In M. J. Hall & L. Patel (Eds.), *Leading the learning function* (pp. 227–239). ATD Press.
- Merriam, S. B., Caffarella, R. S., & Baumgartner, L. M. (2007). *Learning in adulthood: A comprehensive guide* (3rd ed.). Jossey-Bass.
- Microelectronics Workforce Development Activities, 42 U.S.C. § 18997 (2022). <https://www.law.cornell.edu/uscode/text/42/18997>
- National Science Board. (2022). *Science and engineering indicators 2022: The state of U.S. science and engineering* (NSB-2022-1). National Science Foundation. <https://nces.nsf.gov/pubs/nsb20221>
- National Science and Technology Council. (2022). *National strategy for advanced manufacturing*. Executive Office of the President of the United States.
- Pink, D. H. (2009). *Drive: The surprising truth about what motivates us*. Penguin and Riverhead Books.
- Robertson, J., & Heckroodt, S. (2022). The stakeholders in action learning: Aiding individual transformative learning. *Action Learning: Research and Practice*, 19(1), 81–88. <https://doi.org/10.1080/14767333.2022.2033029>
- Rosenfeld, R. B., Wilhelmi, G. J., & Harrison, A. (2001). *The invisible element: A practical guide for the human dynamics of innovation*. Innovatus Press.
- Rude, D. (2022, August 18). *Microelectronics workforce development: A learning partnership case study* [Conference session]. Federal e-Learning Science & Technology (iFEST) Conference, Alexandria, VA, United States. https://www.nts.org/-/media/sites/ntsa/events/2022/21d0/agenda/ifest-2022-program_081822.pdf?download=1
- Russ-Eft, D., & Preskill, H. (2009). *Evaluation in organizations* (2nd ed.). Basic Books.
- Semiconductor Industry Association. (2021). *2021 state of the U.S. semiconductor industry*. <https://www.semiconductors.org/wp-content/uploads/2021/09/2021-SIA-State-of-the-Industry-Report.pdf>
- Shivakumar, S., Wessner, C., & Howell, T. (2022). *Reshoring semiconductor manufacturing: Addressing the workforce challenge*. Center for Strategic & International Studies. https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/221006_Shivakumar_Reshoring_Semiconductor-Manufacturing.pdf?_8r_xAqZZpAxyMFMMtgzuKjIWt.B18Od
- Sleezer, C. M., Russ-Eft, D. F., & Gupta, K. (2014). *A practical guide to needs assessment*. Wiley.
- Training Industry. (n.d.). *Agile learning design*. Retrieved 31 January 2023 from <https://trainingindustry.com/wiki/content-development/agile-learning-design/>
- Vanherck, G. D. (2020). *Officer professional military education policy* (Chairman of the Joint Chiefs of Staff Instruction 1800.01F). Joint Chiefs of Staff.



- Walcutt, J. J., & Schatz, S. (Eds.). (2019). *Modernizing learning: Building the future learning ecosystem*. U.S. Government Publishing Office.
- Wehrung, M. (2020). Go slow to go fast. In M. J. Hall & L. Patel (Eds.), *Leading the learning function* (pp. 209–226). ATD Press.
- Williams, M. E., Armistead, J., & Rude, D. A. (2022). Leading for innovation: A new model for 21st-century leadership. *New Horizons in Adult Education and Human Resource Development*, 34(4), 1–11. <https://doi.org/10.1002/nha3.20366>
-

Note

1. See iFEST 2022—*New Paradigm of Learning: Partner and Prevail*, retrieved 6 February 2023 from <https://adlnet.gov/events/20220816-iFest-2022/>.

