Chapter 3

Literature Review

To Do:

* Read through “Team Success” in NVIVO
* Read through “Network Treatments” in NVIVO
* Read and Summarize:
  + Detecting Rising Starts (Panagopoulos, Tsatsaronis, and Varlamis 2017)
  + Designing interventions for Team Science (Vacca et al. 2015)
  + Delivering impact research team (Bednarek et al. 2023)
  + Network Interventions (Valente 2012)
* Draft an outline of ideas for the below document
* Add Bland et al., 2005 summary work into work below as noted.
* Okraku et al 2017

Introduction

According to (Love et al. 2021), there's limited research exploring the effectiveness of scientific team support strategies like training and team performance metrics, despite considerable investment in collaborative and interdisciplinary projects. (Love et al. 2021) investigates how scientific productivity, advice, and mentoring networks within an exemplary interdisciplinary scientific team contribute to their success, focusing on the team's training processes and their impact on productivity and expertise. Love et al.’s hypothesis suggests a positive correlation between mentoring, advice networks, and scientific productivity, indicating that these elements are integral to the success of interdisciplinary scientific teams. Love et al. uses mixed methods and SNA.

The survey included principal investigators, postdocs, graduate and undergraduate students, and external collaborators (Love et al. 2021). Conducted annually from 2015 to 2019, the survey asked about the extent and type of collaborations, including research publications, scientific presentations, grant proposals, and student committee participation (Love et al. 2021). It also inquired about relationship types like learning, leadership, mentoring, advice, friendship, and leisure activities (Love et al. 2021). [The supplementary material only shows a mid-point survey, which is what SNAP used for the phase one small-teams SNA project (Love et al. 2021).]

The survey data were analyzed using R Studio and UCINET software, with Visone used for visualizations. Three network measures were derived: scientific productivity, mentoring, and advice (Love et al. 2021). These measures were assessed using average degree, in-degree, and out-degree metrics (Love et al. 2021). The study compared advice, mentoring, and scientific productivity networks, predicting a positive correlation (Love et al. 2021). The Quadratic Assignment Procedure was used for statistical significance testing (Love et al. 2021).  
  
Other methods used in this study include case study selection, retrospective team survey, participant observations, interviews, and historical data (Love et al. 2021). The study monitored 25 interdisciplinary teams over five years, recording team outcomes annually (Love et al. 2021). An exemplary team was selected based on interdisciplinary research, team longevity, and fulfillment of the land grant mission (Love et al. 2021). A retrospective team survey was conducted at the study's end, focused on the skills developed by team members and their personal and professional experiences on the team (Love et al. 2021). Participant observations were made at annual retreats and meetings from 2015 to 2019, focusing on interdisciplinary interactions and problem-solving approaches (Love et al. 2021). Interviews with PIs and a historical narrative provided insights into the team's formation and evolution (Love et al. 2021).

1. Scientific Productivity

The team achieved significant outcomes including 33 extramural awards totaling over $5.6 million, 58 peer-reviewed publications with various organizations, 141 presentations, and training for 21 graduate students and 15 postdocs. They also received institutional recognition and various individual honors (Love et al. 2021).

* Individual Productivity
* Research Teams
* Campus-Wide

Productivity: Individual, leadership, and institutional (Bland et al. 2005)

* + What predicts Individual, leadership, and institutional productivity? (Bland et al. 2005)
  + What predicts group productivity? (Bland et al. 2005)

1. Research Team Resilience

* Durability over time: Roster expansion

Starting with four members in 2004, the team grew to 43 by 2018, including 81 individuals over its 15-year span. Their growth was marked by securing major federal research awards, which allowed for significant team expansion and evolution of projects (Love et al. 2021).

What predicts faculty member satisfaction? (Bland et al. 2005)

* Team member integration

The authors describe the importance of long-term investment in IDR to allow for the development of relationships, trust, and overcoming collaborative obstacles (Lyall and Fletcher 2013). They emphasize the need for research leaders to balance multiple goals and engage with various stakeholders (Lyall and Fletcher 2013).

The team's mentorship model included undergraduates, graduate students, and postdocs, fostering skills like cross-disciplinary communication and understanding of disease ecology (Love et al. 2021). Team members, including faculty, developed and learned from each other, enhancing their scientific roles and interpersonal skills (Love et al. 2021). The average number of mentors reported by team members ranged from 2.4 to 3.1, with graduate students reporting up to 7.7 mentors (Love et al. 2021). Over time, junior scientists migrated to be core members of the scientific productivity network (Love et al. 2021). [Small-teams position in CUPID network]

The advice network within the team was strong, with team members reporting an average of 5.1 to 6.4 advisors (Love et al. 2021). This network evolved over time, with a more integrated involvement of postdocs and graduate students by 2018 (Love et al. 2021). Team members, including faculty, valued the professional and personal support received from these advice networks (Love et al. 2021).

The study found a correlation between mentoring, advice networks, and scientific productivity (Love et al. 2021). Team members reported that being part of the team enhanced their skills, relationships, and professional growth, directly contributing to their scientific success and productivity (Love et al. 2021). Social dynamics are influential in explaining knowledge creation processes (Love et al. 2021). The team’s scientific productivity was driven by their interpersonal relationships (Love et al. 2021).

* Professional growth of individual members: Learning, position

Collaboration is expected to play a role in an individual scientists’ development in scientific, technical and social knowledges and resources (Duysburgh et al. 2012). However, institutional factors require interdisciplinary researchers to plan their personal development more carefully than researchers on a more conventional path (Duysburgh et al. 2012).

<https://docs.google.com/document/d/1s-WAXmc042cVLuB83spK2JH_B5SZo8DE/edit?usp=sharing&ouid=114275839804722059389&rtpof=true&sd=true>

* Leadership and Project Management

The article highlights the need for effective research leadership to develop and nurture interdisciplinary research capacity (Lyall and Fletcher 2013). It discusses the importance of managing complexity and the skill of setting constructive boundaries around research areas (Lyall and Fletcher 2013).

The article discusses the importance of defining and creating the identity of interdisciplinary research units, negotiating multiple identities and roles, and establishing a common purpose (Lyall and Fletcher 2013). It also highlights the need for institutional support and governance structures that accommodate IDR (Lyall and Fletcher 2013).

1. Interdisciplinary Collaboration

* Equitable Inclusion in Interdisciplinary

The team comprised experts from diverse fields like ecology, genetics, and veterinary medicine, involving members from 39 universities, 11 federal agencies, 13 state agencies, and other organizations. This diverse collaboration enhanced their interdisciplinary research capabilities (Love et al. 2022).

1. Fulfilling the land grant mission (Love et al. 2021). [this is like fulfilling the grand challenges mission or BSU campus wide goals]