NATIONAL SOCIO-ENVIRONMENTAL SYNTHESIS CENTER

Explainer: Best Practices for Interdisciplinary Team Research: Shaping a Team's Social Environment

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The environment that teams collectively create as they interact—their **social environment**—has a significant influence on the likelihood their experience will be positive and productive. It includes how members deal with differences and make decisions, as well as their willingness to take risks. Following Freeth and Canigilia (2020), another way to consider a team's social environment is to think about collaborations as "spaces that comprise epistemic, symbolic, spatial, and temporal dimensions that produce different degrees of comfort and discomfort for researchers" (p. 247). Below, we describe what influences collaborative environments and provide a few practical ways to enhance them. These strategies include the resources "What Is Interdisciplinary Team Research? Are There Best Practices?" and "Building an Interdisciplinary Team."

Influential Factors

The process of interaction and communication within new teams can be stressful, pleasurable, stimulating, or isolating. The nature of this is shaped by a number of things including **individual attributes** of team members such as their interpersonal skills, integrative thinking abilities, experiences, perceived power, and ability to cope with conflict. Differences in these inevitably exist and how a team deals with them influences their success or failure from a research perspective and as a member, as well as the satisfaction of individual team members. A team's social environment is also shaped by the team's collective attributes—their ability to negotiate challenges and develop a shared sense of accomplishment, community, drive, and focus (Gersdorf-Van den Berg et al. 2022). Creating a sense of comfort in which there is mutual respect (Schwartz and Bennett 2021) during discussions is key to positive collaboration experiences and key to effective research outcomes, including high-impact publications and/or broader societal impacts from convergent research.

Strategies

While many scholars have acknowledged the importance of social dynamics in team progress, only a subset of studies hint at what can be done *in practice* to help shape that environment in positive ways. Below we highlight some of the ideas and concrete suggestions for team members and leaders. These strategies are not listed in any particular order.

- **Schedule social interactions.**
  Research has shown that personal connections can enhance a team's social environment—even ones as small as learning that one has a friend in common with another team member or that both have visited some of the same places. Social events, such as dinners together, happy hours, or roundtables sharing about members' lives, are all exercises that help build social ties. These events should happen in the very first meeting and repeatedly thereafter.

- **Allow the entire team to set meeting goals, agendas, and facilitative practices.**
  Active engagement in managing a collaboration creates a sense of shared ownership and individual responsibility. One way to enhance this engagement is for members to take turns developing meeting agendas, taking into account others' views, and to take turns facilitating interactions during the meetings. Having the whole team read and discuss best practices for facilitating team research would be time well spent (e.g., Facilitating Interdisciplinary Meetings).

- **Engage in reflexive discussions.**
  Over the long term, the most important activity for a team is to be reflexive about how they are interacting as a team—specifically, to initiate discussions at regular intervals, prompted by members' views on how they feel about their interactions. This kind of discussion could be initiated by taking time during team meetings to ask each member to submit anonymous comments that can then be discussed or to identify specific ways they can improve their interactions. Another way to initiate such discussions is to ask the team to identify which prior objectives were and were not met and consider why or ask them to develop a list of strategies the group can use to keep all members engaged and contributing.[1]

- **Devote time for sharing expertise.**
  It is essential that team members have time to talk about themselves and their perceived role(s) in the project. While the opening of the first team meeting should include introductions and ~1-minute input from individuals on their expertise, something deeper—say 5–7 minutes—about the theories, types of data, and methodological approaches they bring to the table is much more important and better done later, after some social interaction time, e.g., after the first lunch. It is also very important to encourage other members to ask questions and/or reflect on what they have heard each person say. Break these up into sessions of no more than 45 minutes, interspersing them with activities. Examples include discussion of individual and team goals, development of interaction "rules" or publication policies, or other activities mentioned in the next bullet. But taking the time to do this is important for multiple reasons—not the least of which is enhancing a sense of scholarly credibility on the part of each individual.

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[1] Some of these ideas are adapted from Chapter 15, section "Team Reflexivity Training" in the 2015 book *Enhancing the Effectiveness of Team Science* by a National Academies committee.

- **Design activities to elicit divergent views.** Activities that result in the expression of divergent views, novel ideas, or individual differences in thinking about, conceptualizing, or solving a problem set the stage for integrative research. It is easy for teams to go down disciplinary paths, potentially even splitting into subgroups for some or all tasks. To avoid this division, the first step is to reveal divergent thinking among members and then moving beyond this "stage setting" to brainstorm as a group how to integrate that thinking—asking how can we bring our diverse perspectives together? (Hoffmann et al. 2023). Disciplinary knowledge does not provide the path to integration, but some team members will want to try that. Teams can use activities to reveal different views, some of which may be tacit on the part of individuals (the table on the next page) and then proceed with considering integration.

- **Minimize power imbalances.** Salazar and Lant (2018) focus extensively on the importance of leaders in overcoming dominance by individuals with perceived power or with specific disciplinary perspectives. The authors emphasize this step is not only important for team interactions but for innovation. Dominance suppresses creativity and can lead to hostilities. A leader's level of team research experience can determine their success with what SESYNC calls gentle interventions. Namely, gently, not confrontationally, shifting the team in new directions that require broader engagement and new views is essential.

- **Diversify teams.** Extensive research in multiple studies has shown that the presence of women on collaborative teams enhances the social environment, as well as the research outcome (e.g., Woolley et al. 2010), partly because they tend to play significant roles in mentoring and enhancing turn-taking during meetings (Love et al. 2022). Research to determine if racial and ethnic diversity enhances team social environments has led to conflicting results—stereotyping complicates the analysis. Diversity in perspectives and experience has been shown to enhance creativity and knowledge integration when conditions are equitable and all members are integrated (Smith-Doerr et al. 2017). Diversity increases the informational resources of the team, and the different views of diverse team members can stimulate constructive debate, a deeper elaboration of task-relevant information, and creativity (Moriano et al. 2020).

- **Use discomfort and disagreement to promote team learning.** Rather than soothing disgruntled members or smoothing over conflict, make it a topic of discussion. Pointing out that the disagreement is interesting and asking the group to explore what it might mean for changing directions (or not), accommodating reasonable needs, considering novel ideas, or simply being more tolerant of others' views is useful for the team to move forward. Freeth and Canigilia (2020) suggest that during the first team meeting, members identify specific activities or structured discussions that a team can use to cope productively rather than passing over conflicts. Civil rules of engagement are critical.

Activities to Make Explicit Divergent Views: The Next Step of Integration

Bringing divergent team member views out and making them tangible to all enhances team understanding and moves the team toward integrative problem solving. Group activities can help with this unearthing of divergent views, and a few examples are given below. In each case, individuals should complete the task on their own and then present their result to the group, allowing time for questions. The most critical step for each of the activities below is the discussion of what was presented and why individuals believe their view(s) are important. The discussion helps the team consider diverse dimensions of and approaches to the research. The next step is to brainstorm how to integrate across those dimensions, problem-solving approaches, and/or views.

Mental Models – Exercises to develop conceptual diagrams or other visualizations of the research problem components and their links are extremely useful. Leaders could provide large pieces of paper and colored pens and allow members to spend time drawing how they would visually depict the research problem and/or the information needed to solve it. Then, team members should share their visualizations with the group and brainstorm ways to integrate them into a shared mental model.

Response Prompts – Team members can interpret open-ended statements related to the research very differently. Team leaders could provide guidance, such as prompts for team members to rate in terms of agreement or to which they can respond by free writing. Teams using research prompts and implementing the "Toolbox Initiative" have successfully built team cohesion. An example of a prompt for a team work on urban food might be: "The social and environmental sustainability of urban gardening projects is determined by…" Such questions could have a choice of answers provided or be left open-ended.

Provocative Questions – Much like prompts, provocative questions are meant to elicit differences in thinking or in our views that are relevant to the research, often in relation to research methods or approaches. Such questions could be very specific to the project or very general. Examples include: "How would you rank the value of the humanities, the social sciences, and the natural sciences for use in addressing research problems?" "What value does each disciplinary type have for you in your work?[2] or "What causal links do you think are most challenging for this research?"[3]

Boundary Objects – Providing an artifact or other boundary object that can help a member summarize or understand the research problem is another tool for team building. For example, members find a photo or object that they believe to be relevant and then share it. For the urban example above, one might select a photo representing urban crime or poverty to depict the problem families may have in getting food while another person selects a photo of someone weeding a beautiful urban garden suggestive of local organic farming solutions. Artifacts are often maps or layers of imagery—all of which stimulate discussion. Mental models can also be considered boundary objects.

Gamification – Multiple studies have shown that engaging in highly interactive games can improve team and consensus building, creativity, engagement, and management of conflicts (e.g., Parjanen and Hyypiä 2019; Patricio et al. 2022). The best games are simple and have elements that are relevant to researchers in some way. Ideas for games to help bolster engagement by research teams include those summarized by Webster (2018), those created specifically for interdisciplinary collaborations (e.g., COLLAB), and a variety of commercial games largely developed to enhance creativity among business teams (e.g., www.signatureteambuilding.com/).

[2] Examples of general prompts like this are from a paper by Machiel Keestra.

[3] This example is from Pohl et al. 2019.

Many useful articles are cited as linked in the body of this explainer, but the article below and under "Related SESYNC Content" are those we recommend as comprehensive:

Hoffmann, S., Weber, C., & Mitchell, C. (2022). Principles for Leading, Learning, and Synthesizing in Inter-and Transdisciplinary Research. *BioScience, 72*(10), 963-977. https://doi.org/10.1093/biosci/biac057

Related SESYNC Content

- SESYNC. (2023, May 19). *Team Science, Interdisciplinary, and Transdisciplinary Resources*. https://www.sesync.org/resources/team-science-interdisciplinary-and-transdisciplinary-resources
- Palmer, M.A. (2023, May 15). *What Is a Shared Mental Model? Why Are Mental Models Useful for Interdisciplinary Research?* SESYNC. https://www.sesync.org/resources/what-shared-mental-model-why-are-mental-models-useful-interdisciplinary-research
- Graef, D., Kramer, J.G., & Motzer, N. (2022, May 25). *Facilitating Interdisciplinary Meetings: A Practical Guide*. SESYNC. https://www.sesync.org/resources/facilitating-interdisciplinary-meetings-practical-guide
- Fiore, S. (2021, November 23). *The Science of Team Science Part 2: Conducting Team Science and Measuring Outcomes*. SESYNC. https://www.sesync.org/resources/science-team-science-part-2-conducting-team-science-and-measuring-outcomes
- Palmer, M.A., Kramer, J.G., Boyd, J., & Hawthorne, D. (2016, April 1). *Practices for facilitating interdisciplinary synthetic research: the National Socio-Environmental Synthesis Center (SESYNC)*. SESYNC. https://www.sesync.org/research/practices-facilitating-interdisciplinary-synthetic-research-national-socio-environmental

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