Interdisciplinary Team Science: Annotated Bibliography and Coaching and Training Module

This combination of an Annotated Bibliography and a Coaching and Training Module highlights key resources and offers suggestions on how to use them for self-tutorials, coaching and mentoring others, and presentations and support materials in workshops, colloquia, and short courses.

Additional related modules on this website focus in greater detail on Education and Training and on Evaluation.

In order to be successful, Team Science requires understanding antecedents, processes, and outcomes of collaboration among experts from different disciplines, professions, and fields. The Science of Team Science (SciTS) is an emergent field that studies barriers, facilitators, and best practices. This combined bibliography and training module identifies key resources from the literature.

It covers five areas:

(1) introductions and overviews, including definitions and rationale for teamwork

(2) resources for successful collaboration, including team building and management

(3) evaluation, including tools and strategies for multiple stages

(4) training, including best practices and core competencies

(5) strategies for finding more resources and staying up to date.

Note. Access to article links requires a Wayne State University access ID and password. All URLs were accessed 11 June 2014.
FAQ #1: Where can I find introductions and overviews?


Provides a comprehensive overview of team science in a special issue on the nature of the field, theoretical perspectives, methodological contributions, and future directions.

- Individuals and groups may read and discuss introductions to the field, especially “The Science of Team Science” (S77-89) and “The Ecology of Team Science” (S96-115).
- Leaders and teams can frame discussion and planning around specific articles on the topics of leadership, training, evaluation, collaboration readiness, and systems thinking.

**Promoting Team Science at the University of Colorado Denver: Leadership for Innovation in Team Science (LITeS).**

http://www.google.ca/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=0CDIQFjAB&url=http%3A%2F%2Fecctsi.ucdenver.edu%2Ftraining-and-education%2FDocuments%2FFLITESTeamScienceReport2013.pdf&ei=fjAVU9XxE6bp0gH_vYD4Cg&usg=AFQjCNFZAE-oCFNnoq3AaoAPkgUmPT2ppQ&sig2=xGjC8iC_4blVi9Eb0rSFZw&bvm=bv.62286460,d.dmQ

Covers topics emanating from interviews with collaborative teams at the University of Colorado Denver’s Anschutz Medical Campus.

- Planners can read the entire report for a preliminary overview of how to foster team science locally, informed by national trends.
- Planners, team leaders, and groups can use individual chapters to frame discussion of specific areas including education and training, funding, space and the physical environment, and toolkits for improved practice.

For shorter syntheses in single articles, see:


https://webfiles.uci.edu/dstokols/Pubs/Stokols%20et%20al.%20HOI%20Chapter%2032.pdf

Covers key terms, characteristics, models and frameworks, methodologies, training, evaluation, and collaboration readiness. Includes graphics depicting logic models, a schematic of antecedents-processes-outcomes, and a typology of contextual factors influencing effectiveness of collaboration.

Defines the nature of team-based transdisciplinary (TD) approaches in public health research and education, illustrates a four-phase model of a TD initiative with support table, and presents guidelines for success evaluation and outcomes. Textbook-style learning objectives, review questions, and glossaries also make it useful for self-directed learning and teaching.


Outlines justification of team science efforts based on expert interviews, with discussions of funding and grant strategies, partnerships, technology, and academic incentives, as well as bridging of gaps across academic cultures and recognition and budgeting in university-community and industry alliances and

See Also For Background Reading


Presents findings from a concept mapping exercise to define the field of team science. Synthesizes inputs from key informants and stakeholders in seven meta-areas of research central to refining and developing the field.


Defines best practices and policies for team science. Includes comparisons between multiple levels of research, ways of translating theory into practice, and ways of improving interdisciplinary research and theory in team science.
FAQ # 2: Where can I learn about strategies for successful collaborations?


Presents an introductory overview of characteristics, processes, and dynamics of successful collaboration.

- Leaders and teams can use for common background reading.
- They can focus at an early stage on sections devoted to starting to think about and preparing for team science, building a team, fostering trust, and developing a shared vision, along with practical guidelines such as “The Collaborators’ Pre-Nup.”
- They can use other sections to focus on handling conflict and common challenges, strengthening team dynamics, and navigating and leveraging networks and systems.
- They can use case studies and scenarios to demonstrate dynamics of collaboration, and return to checklists of review questions on an iterative basis to assess progress.


Discusses two aspects of effective collaborations: ways to effectively construct and manage collaborative teams and ways to promote trust. Includes evidence-based guidance for managers and links to specific tools for conducting and evaluating team science.

- Leaders and teams can use for both presentations and internal review guidelines. Includes the Collaboration Wizard, Toolbox workshop for examining dimensions of collaboration and communication, Questions for Scientific Collaborators, and the Team Science Toolkit.


Describes an evaluation tool for assessing dynamics of a collaborative group process and community-based partnerships. Based on literature review and three case studies

- Leaders and teams can adopt or adapt the tool for local use.
- They can use case studies as scenarios for discussion of team dynamics.
- They can focus on passages dealing with specific factors for collaborative success such as shared leadership, two-way communications, conflict resolution, a shared vision, participatory decision-making, problem-solving procedures, shared resources, mutual trust, and efficient management.
[http://sss.sagepub.com.proxy.lib.wayne.edu/content/35/5/703.short](http://sss.sagepub.com.proxy.lib.wayne.edu/content/35/5/703.short)

Presents findings of a study of 62 collaborative multidisciplinary science projects.

- Leaders and teams can use to frame discussion of favorable conditions for specific aspects of team science, including coordination, management, and physical space and infrastructure for bringing collaborators together on a regular basis.

**Note:** Cross-check articles in the special issue of “The Science of Team Science in the *American Journal of Preventive Medicine*, in FAQ #1.

See also:

[http://heb.sagepub.com.proxy.lib.wayne.edu/content/29/6/683.short](http://heb.sagepub.com.proxy.lib.wayne.edu/content/29/6/683.short)

Describes an evaluation tool for assessing the synergy of partnerships in six dimensions of functioning.

- Leaders and teams can use at an early stage of planning to foster common understanding of the six dimensions of leadership, administration and management, efficiency, non-financial resources, and challenges of partnership and of community involvement.
- They can follow specific recommendations for longitudinal designs, large partnerships, and collaborative process.


Considers collaboration from perspectives of public health partnerships, including academic institutions, health service centers, and community agencies. Explains how stakeholder perspectives lead to differing views of implementation and success in both general categories and subgroups.

- Leaders and teams can use to frame understanding of five sets of anticipated outcomes: impact of health professions education, curricula and services, students, community and policy, and sustainability and structural change outcomes.
FAQ #3: Where can I find resources for evaluating team science?
For further resources see also the Evaluation module on this website.


- Leaders and teams can use to define appropriate criteria for evaluating interdisciplinary collaboration based on authoritative literature review.
- They can structure combinations of suggested quantitative and qualitative approaches while emphasizing the importance of integrative and holistic framework for evaluation.


Illustrates a multi-method assessment and evaluation of translational teams in a case report.

- Leaders and teams can use to guide discussion of multiple types of evaluation including unobtrusive measures, surveys, interviews, and focus groups across outcomes, process, and developmental evaluation.
- They can adopt or adapt logic models and classifications of team projects into the categories of early development, traditional, process-focused, and exemplary.

http://ntr.oxfordjournals.org.proxy.lib.wayne.edu/content/5/Suppl_1/S21.short

Presents a comprehensive framework for conceptualizing and evaluating innovative large-scale research programs based on use tobacco initiatives (TTURCs).

- Leaders and teams can use specific methods and measures for focusing on collaborative activities, personal attitudes, values, collaborative readiness, and common challenges.

Presents a report and comprehensive instrument for evaluating inter- and trans-disciplinary research, adaptable to specific contexts and features of research programs.

- Leaders and teams can use the Catalogue of Criteria as both a coaching model and an evaluation instrument, with flexible sequencing and combining of questions from a pool of options.
- They can zero in at different times on stages of ex ante, intermediary, ex post, and impact evaluation.


A method for assessing quality and relevance of research for science and society based on experiences in agricultural sciences and in pharmaceutical sciences. The Research Embedment and Performance Profile (REPP) is a quantitative reconstruction of a group’s activities and performance based on analysis of the missions and/or profile of a research program or group, stakeholder analysis, and feedback and discussion.

- The REPP is adaptable to many contexts, enabling groups to depict in a graphic radar plot a broad range of indicators of research performance and outcomes across multi-, inter-, and trans-disciplinary projects, programs, and fields.

See also:


Provides overview of meta-theoretical frameworks, disease-specific conceptual models, and exemplars of collaboration. Includes integration of biological, behavioral, ecological, social, and cultural factors related to population health disparities at proximal, intermediate, and distal dimensions.

- Leaders and teams can focus of models and best practices to inform planning and implementation at multiple levels of analysis and cross-center cooperation, research infrastructure, communication with the community, and translation of research into prevention/intervention.

Presents a comprehensive overview of methods for evaluating team science, the evidence base promoting team science efforts, and tools and resources for implementing science projects.

• Leaders and teams can use for presentations and reviews of progress with checklists.

FAQ # 4: Where can I obtain resources for training and professional development?
For further resources see also the Education and Training module on this website.


Provides a conceptual overview of transdisciplinary (TD) training based on literature review. Argues that a TD orientation is an intra-individual construct that should allow for broad exposure at undergraduate, post-graduate, and post-doctoral levels, as well as career mentoring.

• Individual researchers, mentors, and groups can use the five-factor framework as a checklist for developing and assessing a transdisciplinary orientation. It may also form a basis for designing inter- and trans-disciplinary programs, assuring each step develops requisite skills.

Valuing: a broad and comprehensive understanding of complex research and social issues and translating these broader conceptions into solutions

Attitudes: positive dispositions for bridging boundaries of multiple disciplines in seeking solutions to research and social issues

Belief: conviction that integration is essential to furthering understanding of complex scientific and social phenomena

Knowledge Base: sufficient breadth and depth to allow for high levels of integration and synthesis

Behaviors: actions such as working with colleagues in different disciplines, coursework in other areas, and efforts to develop and promote transdisciplinary concepts and methods.

Provides results of content analysis of 129 NSF grants emphasizing interdisciplinary training and/or research.

- Leaders and teams can use to guide discussion of five central categories of disciplinary grounding, conceptual and methodological integration, effectively working in teams, communication skills, and critical awareness.


Describes Cancer Prevention Fellowship Program (CPFP) of National Cancer Institute as a model of how to train new health science researchers for careers in interdisciplinary areas.

- Leaders and teams can use for review of options including didactic education, research mentoring, a professional development series, and best practices integrating effective features of traditional postdoctoral training with newer approaches more suited to interdisciplinary training.


Reports results of a key informant approach to defining core competencies of interdisciplinary research. Includes activities outside home discipline such as reading, teaching courses, employing methodologies, and meeting with colleagues.

- Leaders and team can use the 19 core competencies as a checklist for assessing student learning, divided into categories of Conduct Research, Communicate, and Interact with Others.

Presents an overview of mentorship, methods, and common concerns with accompanying discussion of nomenclature, and preparation for career trajectories.

- Individuals may use tools and conceptual overviews for self-tutorials and mentoring.
- Groups may use the article use as a discussion piece.
- **Figure 1** will be a helpful handout and conceptual framework for writing a training grant, with a "big picture" model of training approaches, barriers, and facilitators.
- **Table 2** could be handout or presentation guide describing the range of training strategies and specific elements that have proven to be successful.
- **Table 3** is useful as a handout or rubric for evaluating the degree to which a proposal or a manuscript meets criteria for interdisciplinarity. Faculty mentors can use it to guide assignments, evaluations, training, and conducting research.

See also:


Presents a qualitative evaluation of the Building Interdisciplinary Research Careers in Women's Health (BIRCWH) program at the University of Michigan.

- Leaders and teams can use to structure activities for mentoring interdisciplinary careers and collaborative research.

**FAQ#5: How can I find more resources and stay up-to-date?**

**Tool Kit: A Resource Repository**
Contains an online repository of over 875 resources, applications, and instruments. Includes models, methods, and materials for evaluation with assessment interviews, metrics, and algorithms as well as peer-reviewed articles and reports of both theories and methods.  

- Any user may browse tools, measures, or bibliography, or search by topics.

**SciTS ListServ: Mendeley**
Offers a forum for cross-disciplinary and inter-professional exchange of information and resources on a broad range of topics related to team science.  
http://www.mendeley.com/groups/3556001/science-of-team-science-scits/

- Members can search resources, create subgroups, and add references and comments.
For Further Background Reading, see also:


A collection of postconference essays on the nature of interdisciplinary collaboration and problems and processes of inquiry, representing all seven disciplines of the Cognitive Science Society. Contains case studies of collaboration *in situ* and a closing section on the exemplar of cognitive science.


http://books.google.com.proxy.lib.wayne.edu/books?hl=en&lr=&id=forE0oHeHQC&oi=fnd&pg=PR7&dq=Breaking+Out+of+the+Box:+Interdisciplinary+Collaboration+and+Faculty+Work&ots=U2ZX4DlfEE&sig=cAl8CEOoTT3moo7_1kdFsU6SsRcQ#v=onepage&q=Breaking%20Out%20of%20the%20Box%20Interdisciplinary%20Collaboration%20Faculty%20Work&f=false

A three-stage model of collaboration and discussion of the four dimensions of disciplinary orientation, knowledge engagement, work orientation, and leadership orientation; based on literature review, experience in postsecondary education, and an in-depth study of a research team contracted to an inner-city community council.