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Pedagogy for Interdisciplinary Habits of Mind

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ABSTRACT

Teaching interdisciplinary courses requires instilling interdisciplinary habits of mind by using strategies for active learning and reflective thinking. This publication emerged from discussions and surveys used to evaluate interdisciplinary habits of mind and pedagogies drawn from different disciplines. Prior to face-to-face discussions, surveys were sent to 75 expert faculty who had great experience teaching IDS courses. The breakout discussions were observed, transcribed, and analyzed. After analysis, the authors came to three conclusive inferences: (1) Course organization and structure have an important albeit indirect effect on pedagogy, (2) traditional pedagogies have an important role to play in teaching interdisciplinary courses, and (3) active learning is especially important in interdisciplinary pedagogy, not just a supplement.

Keywords: active learning, interactive practice, interdisciplinary, teaching

INTRODUCTION

We start with the presumption that teaching interdisciplinary courses requires instilling interdisciplinary habits of mind. These habits of mind have been identified over the last half-century by faculty members experimenting

(in the non-scientific sense of the word) with different pedagogies for interdisciplinary undergraduate courses (Haynes 2002; Smith & McCann 2001). Often these have been general education courses where the focus was on learning outcomes more than on particular subject matter. The pedagogies that seemed to produce the most desirable habits of mind were the ones that got repeated and tweaked. ('Seemed' because the evaluation of most of these "experiments" tended to be casual and subjective, but also because interdisciplinary habits of mind are notoriously difficult to measure.)

The interdisciplinary habits of mind identified through these trial-and-error pedagogical experiments have largely remained at the level of what Michael Polanyi (1958) calls the "tacit knowledge" of individual teachers or teaching teams, though some have been shared with interdisciplinarians at other institutions in venues such as the annual conferences of the Association for Integrative Studies, the Association for General and Liberal Studies, and kindred professional groups. Even then, the focus of such presentations has been usually on the pedagogies employed to instill these, not so much on the habits of mind themselves. Little attempt has been made to collect, organize, and codify either the interdisciplinary habits of mind or the pedagogies used to promote them.

As we prepared to serve as co-discussion leaders for the CONFERENCE session on interdisciplinary pedagogy, we decided to take advantage of the wealth of practical knowledge of interdisciplinary teaching represented at the conference by enlisting conference participants in identifying pedagogies that promote interdisciplinary habits of mind. We started by sharing with the roughly 75 pre-registered conference participants a random order list of interdisciplinary habits of mind developed by the first author from years of attending national conferences on interdisciplinary studies as well as from serving as consultant and external reviewer on interdisciplinary higher education. We asked the prospective CONFERENCE participants to propose additions, deletions, or corrections to the list, which we then revised. Next, we organized the list into categories representing four generally recognized parts of the interdisciplinary process (Repko 2012), i.e., drawing, modifying, integrating, and evaluating insights drawn from different disciplines. The revised and categorized list of interdisciplinary habits of mind was then shared with participants at the conference. Participants were assigned to separate breakout sessions, and asked to discuss two questions announced prior to the conference: (1) What pedagogical techniques are useful in promoting each core habit of mind, and (2) How do they work?

RESEARCH METHOD

Four separate breakout groups independently arrived at similar strategies for discussing these questions. They focused on the four categories of habits of mind one by one, identifying pedagogies useful in promoting any or all of the habits of mind within each category, and using discussion of how each pedagogy works to clarify how it produces such habits of mind, essentially vetting it. The discussion leader listed clarified and vetted pedagogies under each category—drawing, modifying, integrating, and evaluating—on the whiteboard or Post-it notes (which we photographed immediately afterwards). Student assistants took notes as well on the discussion in each breakout session, and those notes were shared with us following the conference. And a representative of each breakout group reported the results of their discussion in a plenary session that followed immediately (which we recorded). Afterwards, we transcribed and coded this information as data for analysis. The resulting tables, figures, and word cloud can be found in the appendix.

RESULTS

Table 1 presents the list of interdisciplinary habits of mind vetted by CONFERENCE participants. This list should be of use in its own right to faculty and administrators designing, administering, and assessing general education requirements and the interdisciplinary courses meant to fulfill those requirements.

Table 1: Interdisciplinary Habits of Mind

1. Drawing insights from diverse perspectives into complex issue
• Strive for adequacy in (the narrowly relevant concepts and theories of) each discipline, as well as a feel for its perspective.
• Seek out diversity of perspectives for richer and more comprehensive understanding.
• Identify perspectives and knowledge in relevant interdisciplinary fields.
• Identify pertinent knowledge and information in diverse disciplines and fields using digital technologies.
• In interdisciplinary collaborations, be alert to relevant approaches of other team members and their disciplines.
2. Evaluating insights

• Assume every disciplinary perspective has at least a kernel of truth.
• Assume whatever you're attempting has probably been tried before, at least in part.
• Proceed methodically even though the disciplines from which you draw employ different methods.
• Bracket and set aside/suspend personal convictions.
• Recognize all sides of an argument, avoiding overstatement and overconfidence.
• In evaluating disciplinary insights look for strengths in arguments you dislike and weaknesses in those you like.

3. Modifying insights
• Seek commonalties not compromises, i.e., win-win situations (in modifying and integrating insights.)
• Think holistically, contextually, and systemically.
• Think dualistically, i.e. either/or (in drawing insights from disciplines) but also inclusively, i.e. both/and (in integrating their insights).
• Embrace contradiction--ask how it can be both.
• Use the techniques for creating common ground in adjudicating conflicts in disciplinary insights.

4. Integrating insights into comprehensive understanding of issue
• Look for unexamined linkages and unexpected effects.
• Seek unanticipated effects by re-contextualizing: look at different time frames, scales, and cultures.
• Expect multiple causes and effects.
• Resist urge to assign numbers to things not inherently quantitative, especially if they can be viewed differently from different perspectives.
• Don't fall in love with a solution until you understand the full complexity of the problem.
• Strive for balance (among disciplinary perspectives).
• Integrate as you go (instead of waiting for all discipline's insights).
• Value intellectual flexibility and playfulness.
• Seek understanding responsive to contributing theoretical perspectives and empirical patterns of behavior.
• In constructing comprehensive understanding be responsive to all perspectives but dominated by none.
• Persuade your audience with evidence not claims, note that disciplines have different standards of evidence.

Because the habits of mind are grouped according to the part of the interdisciplinary process in which they are developed, the table can contribute to discussions of interdisciplinary process. The habits of mind listed under each part of the interdisciplinary process—drawing, modifying, integrating, and evaluating insights from different disciplines—can be used to clarify the intellectual activity that takes place in each, grounding otherwise abstract discussions of interdisciplinary process in educational outcomes. Even researchers on interdisciplinary teams, especially those new to interdisciplinary studies, may find the list useful as a check on the interdisciplinarity of their research.

Table 2 lists pedagogies identified in any of the four participating breakout sessions as useful in promoting the habits of minds associated with each part of the interdisciplinary studies process, as well as in Table 3 pedagogies more widely applicable to interdisciplinary courses as a whole. This rich smorgasbord of pedagogies should be of interest to faculty teaching interdisciplinary courses as well as to staff and consultants preparing faculty development workshops on interdisciplinary teaching.

Table 2: Pedagogies Promoting IDS Habits of Mind

1. Drawing insights
    a. Teaming diverse student backgrounds
    b. Modeling different perspectives via team teaching
    c. Topics that necessitate ID approaches (guest lectures, hot topics)
    d. Rewarding risk taking (encourage perspectives even if seems naïve)
    e. Scaffolding with case studies
    f. Repetition of the incompleteness of insights/resolution
    g. Explicitly identify the perspective behind each insight
    h. Tying explicitly to earlier discussion
    i. Bringing in faculty from different disciplines to explain how they approach a problem
    j. Using real world examples
    k. Dialogue between team teachers
    l. Leading with theory (which helps students engage with different disciplinary models/questions without negotiating with a whole disciplinary paradigm or mischaracterizing them)
    m. Creating dialogue between advanced students from 2 or more disciplines (which helps make explicit the commonalities/differences between disciplines)

n. Choosing the issue and identifying relevant bodies of knowledge (which helps students make connections between disciplinary models, and build on these connections in applying research
o. Using role playing or charades (to help students detach from their own perspectives in non-threatening ways and imagine other ways of thinking about an issue, event, or position)

2. Evaluating insights
    a. Recognizing whether an insight is relevant
    b. Having a good rubric and sharing it with students
    c. Peer evaluation
    d. Literature review
    e. Successful and failed examples of disciplinary efforts
    f. Recognizing what you need to know for definitive evaluation
    g. Putting a range of convictions on the table before bracketing them
    h. Online facilitation
    i. Clicker-based responses
    j. Devil's advocate assignment
    k. Double edged pharmaceutical exercise
    l. Presenting both sides or taking opposing positions
    m. Modeling their evaluation
    n. Dialogue (maybe modifying or even integrating it)
    o. Phenomena, e.g., drawn from Szostak's list of phenomena (Repko 2012, pp. 106-110) that influence the problem and inform the analysis
    p. Structuring assignments (focusing on IDS methodology and disciplinary perspectives before undertaking the project)
    q. Teamwork fostered by assignments that stimulate rich interaction among students
    r. Assignments that articulate the role of disciplines
3. Modifying Insights
    a. Assignment to design and justify course syllabus
    b. Model UN
    c. Role playing
    d. Academic controversy (debate, class discussion)
    e. Concept maps

f. Presenting range from bargaining and negotiation to alternate dispute resolution
g. Instructor models IDS process
h. Guest lectures representing authentic perspectives, including voices outside academy that present competing arguments
i. Case studies that present unintended consequences
    i. Historical or current events – the latter are much more powerful – can relate to students lives more efficiently
j. Panels of experts who can present multiple perspectives and can help students compare/contrast assumptions and arguments to
    i. Get away from binary thinking that is common in debates
    ii. Help students understand how they frame questions and seek insights
    iii. Ask or modifying questions, uncover assumptions and arguments by comparing/contrasting controversial arguments
    iv. Show students multiple perspectives based on different assumptions/evidence.
    v. Support finding common ground

4. Integrating insights
    a. Capstone seminars
    b. Film festival- or other concrete referrals
    c. Summative public product
    d. Draft NIH/NEH/NSF RFP
    e. Recognizing and incorporating reality
    f. Write short story that demonstrates integrated understanding
    g. E-portfolios that connect elements with narrative
    h. Shared inquiry (from great books, questions without answers)
    i. Multiple drafts with feedback, including face to face meetings
    j. Creativity exercising
    k. Systems modeling
    l. Teamwork/collaborative points

m. Case studies that introduce and revise assumptions, arguments and finally propose a different or extended argument
n. Unintended consequences revealed in those case studies
o. Annotated bibliographies that offer students a range of perspectives that they have to group and then integrate, e.g., 30 papers selected that student groups must annotate and share and then sort by theme and integrate
p. Uncovering bad arguments, e.g. from case studies, and re-envisioning them, and using cognitive dissonance to encourage students to revisit their assumptions

To make comparisons of pedagogies across the four breakout sessions, each of which developed its own labels for pedagogies, we identified key common features of pedagogies mentioned in different sessions. For example, "teaming diverse student backgrounds," "creating dialogue between advanced students from 2 or more disciplines," "peer evaluation," "teamwork," "teamwork/collaborative points," "role playing guests and students," collaborative work," "concept mapping—in teams," and "small group collaboration in person and online" were all coded as "group work." (Each of those pedagogies could also be coded under another commonalty as well, e.g., "teaming diverse student backgrounds" was also coded as "forming heterogeneous streams," and "peer evaluation" was also coded as "peer review.") By identifying common features in pedagogies, we were able to determine which were identified in more than one breakout group and the frequency with which they were identified.

Table 3: Overarching Pedagogies for Integrative Learning

Overarching Pedagogies
1. Policy debate a. Role playing guests and students b. Case studies c. Problem based learning d. Collaborative work e. Critical thinking exercise f. Writing exercises

2. Literature Review
    a. What does authority of different disciplines say?
    b. Debates and restate another's argument
    c. Clashing viewpoints
    d. Editorials and then literature review
    e. Then reflection
3. Challenging multiple assumptions, critical reflection
    a. Take people out of their comfort zones
    b. Confront evidence
4. Synthesis: What's in the house?
    a. Active pedagogies
        i. Problem based learning
        ii. Case studies
    b. Attention to process
    c. Critical reflections
    d. Blurring boundaries of what and how
5. Concept mapping – in teams
    a. Small group collaboration in person and online
    b. Structures syllabi cycling through multiple disciplinary perspectives
    c. Done through digital, collaboration, small groups, re-visiting topics and ideas
6. Case studies
    a. Bring complexity to the classroom
    b. Connect across courses
7. Guest lectures/mixed faculty
    a. Lining case studies
    b. Followed is appropriate reflection and assessment
    c. "Only the first step"
8. Mixed classes
    a. Students bring their own diverse perspectives to discussion
    b. Use inherent diversity in the classroom not just disciplinary

9. Open discussion
    a. Need modeling common ground
        i. Need to know what disciplines look like (underlying – can use role playing of stake holders disciplines)
    b. Intentionality and being explicit
        i. About what "it" is > reflexive about teaching/learning process
        ii. In team teaching
    c. Identifying limits and strengths of disciplines into context
    d. Embracing tensions
10. More open discussion
    a. Need skills of comparative thinking, methodology
    b. Accepting uncertainty, partiality
    c. Sharing/modeling yourself the and the process of revising
    d. Exposing your thought process
    e. Demonstrate multiple perspectives on the same entity

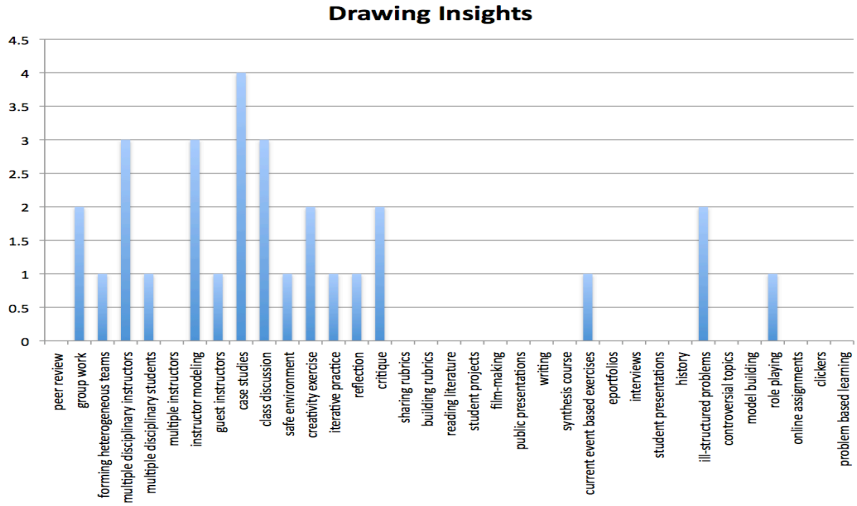

Figure 1.

Pedagogies for Drawing Disciplinary Insights.
Expert faculty groups created lists of best practices appropriate for each stage in fostering students' interdisciplinary behaviors or habits of mind. The authors developed a coding system and coded all data. For each stage software identified the frequency with which common coded features of pedagogies were recommended by expert faculty breakout groups for each part of the interdisciplinary process.

Figures 1 (Drawing Insights), 2 (Evaluating Insights) 3 (Modifying Insights), and 4 (Integrating Insights), identify the frequency with which common features of pedagogies were recommended by breakout groups for each part of the interdisciplinary process. Features of pedagogies that were independently identified by more breakout sessions presumably deserve more attention from faculty members trying to decide which pedagogies to try out in their interdisciplinary courses. Moreover, cursory comparisons of Figures 1-4 make it clear that different pedagogies are useful in different parts of the interdisciplinary process. While the different kinds of thinking required in different parts of the interdisciplinary process have been identified previously (Newell 2007), this is the first empirical validation that different pedagogies are therefore required in different parts of an interdisciplinary course.

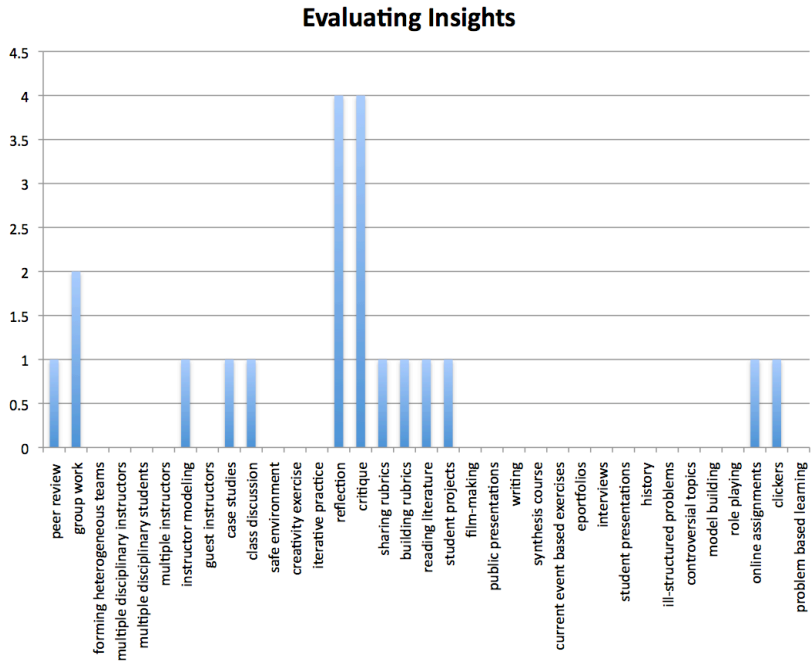

Figure 2. Pedagogies for Evaluating Disciplinary Insights. Expert faculty groups created lists of best practices of pedagogies appropriate for the stage of Evaluating Disciplinary Insights of Habits of Mind. Software identified the frequency with which coded pedagogies were recommended by expert faculty.

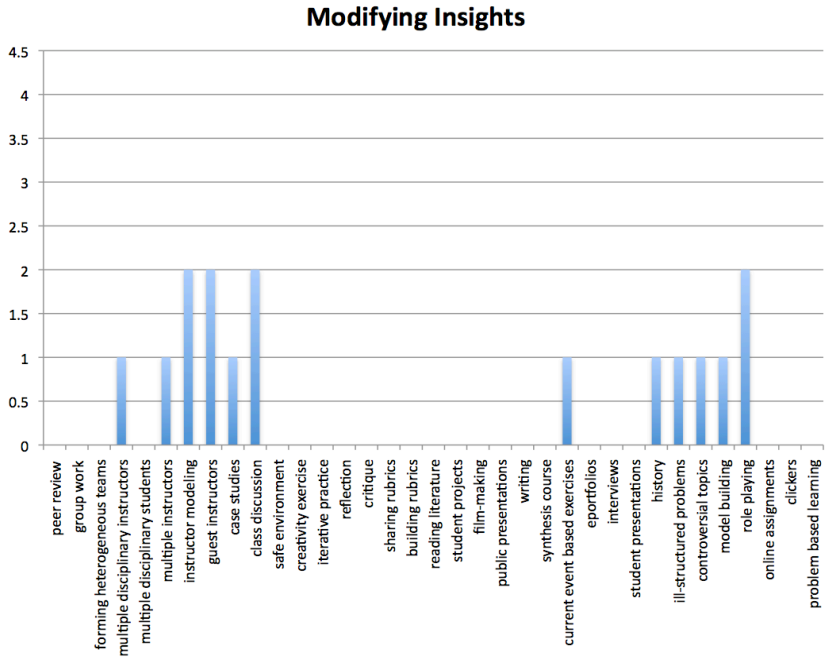

Figure 3. Pedagogies for Modifying Disciplinary Insights. Expert faculty groups created lists of best practices of pedagogies appropriate for the stage of Modifying Disciplinary Insights of Habits of Mind. Software identified the frequency with which coded pedagogies were recommended by expert faculty.

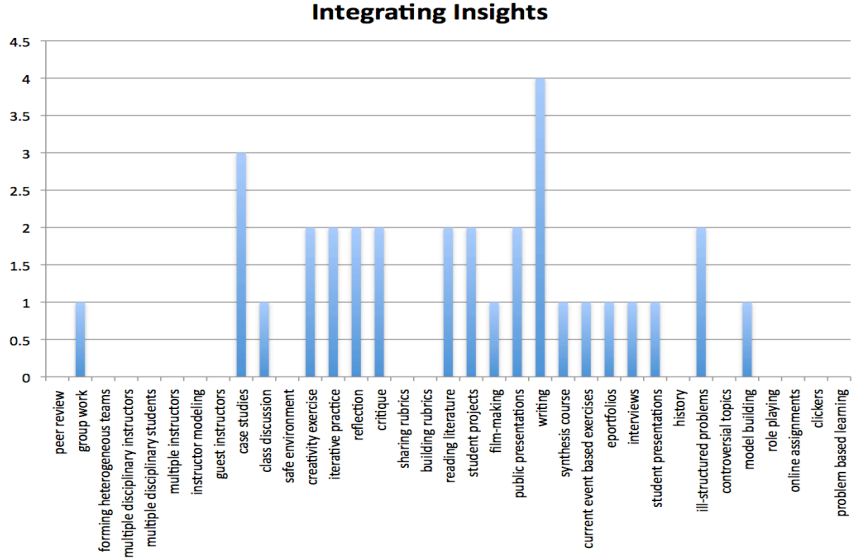

Figure 4. Pedagogies for Integrating Disciplinary Insights. Expert faculty groups created lists of best practices of pedagogies appropriate for the stage of Integrating Disciplinary Insights of Habits of Mind. Software identified the frequency which coded pedagogies were recommended by expert faculty.

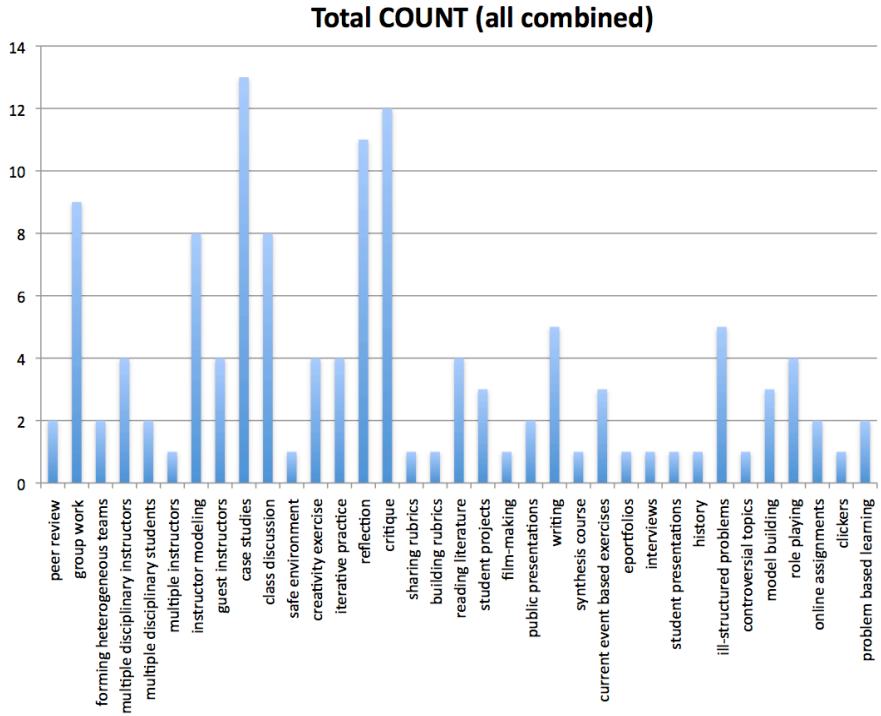

Figure 5. General Best Practices in Interdisciplinary Pedagogy. The data depict the frequency with which key components of pedagogies were recommended by expert faculty for the interdisciplinary process as a whole.

Figure 6. Word Cloud of Interdisciplinary Pedagogies. This word cloud is a weighted word list where font size and color was used to visually model frequency. Faculty groups created lists of best practices of pedagogies appropriate for Interdisciplinary Studies and Habits of Mind. Word Cloud was generated with Jonathan Feinberg's Wordle™ (www.wordle.net) software, which mined comments of instructors and represents high frequency usage of terms with increased font size. These are pedagogies recommended by expert faculty.

Figure 5 (General Best Practices) depicts the frequency with which key components of pedagogies were recommended for the interdisciplinary process as a whole. The 17 pedagogical components recommended most frequently (3 or more times) deserve special recognition. These can be organized and categorized into three groups as follows: A. Overall course structure/organization (instructors from multiple disciplines, guest instructors, and case studies that are current event-based and ill-structured), B. Active learning (group work, creativity exercise, interactive practice, role playing, model building, and student projects), and C. Traditional liberal arts pedagogies (reading the literature, critique, reflection, class discussion, writing assignments, and instructor modeling). What distinguishes this categorized list of pedagogical best practices in interdisciplinary teaching are: (a) It was compiled and vetted by multiple groups of teachers from a variety of institutions; (b) It is grounded explicitly in educational outcomes, namely interdisciplinary habits of mind; and (c) It is consciously embedded in interdisciplinary process.

DISCUSSION AND CONCLUSIONS

From the categories of general best practices, we draw three basic inferences: (1) Course organization and structure have an important albeit indirect effect on pedagogy. I.e., pedagogy is something faculty members have to think about as they conceptualize and design a course, not just as they prepare for each class period. (2) Perhaps because interdisciplinary studies is grounded in traditional academic disciplines, traditional pedagogies have an important role to play in teaching interdisciplinary courses. (3) Active learning is especially important in interdisciplinary pedagogy, not just a nice contemporary add on. In part this may be because interdisciplinarity requires non-traditional as well as traditional thinking; in part, it may be because the central objective of interdisciplinary courses is not to fit students into the status quo but to empower them to function effectively in a complex evolving world. Finally, Figure 6 (Word Cloud) offers a visual representation of the key features of pedagogical best practices in interdisciplinary studies.

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