Talking through it: Using student-to-student interviews and brainstorming for facilitating critical inquiry

By: Krista D. Schmidt

Abstract

Facilitating student engagement, critical thinking, and strategic research approaches are key goals for many teaching librarians in academia. Librarians generally develop different tools to address these goals, depending on the class, the students, and the research in which students are participating. This paper outlines a peer-to-peer interview method developed as part of a workshop for an advanced chemistry class. The goal of this activity is to improve engagement, collaboration, and critical thinking before upper-level students delve into research literature. The activity iterations as well as outcomes, observations, and overall success are described in detail.

Schmidt, K.D. (2017). Talking through it: Using student-to-student interviews and brainstorming for facilitating critical inquiry. *Internet Reference Services Quarterly*, *22*(2/3), 63-72. https://doi.org/10.1080/10875301.2017.1378146

Publisher version of record available at: https://doi.org/10.1080/10875301.2017.1378146

Talking Through It: Using Student to Student Interviews and Brainstorming Activities for Facilitating Critical Inquiry

Krista D. Schmidt

Western Carolina University

Krista D. Schmidt, Research and Instruction Services, Western Carolina University.

Based on a presentation given at The Innovative Library Classroom Conference, Radford University, Radford, VA, May 2017

The author would like to acknowledge the contributions of chemists Carmen Huffman and Brittany Lott, collaborators in the activities described in this paper. Thank you also to colleagues Beth McDonough, Ann Hallyburton, and Heidi Buchanan for providing feedback and suggestions for improvement of this manuscript.

Address correspondence to Krista Schmidt, Hunter Library, Western Carolina University, 176 Central Drive, Cullowhee, NC 28723. E-mail: kschmidt@wcu.edu

Talking Through It: Using Student-to-Student Interviews and Brainstorming Activities for Facilitating Critical Inquiry

Abstract

Facilitating student engagement, critical thinking, and strategic research approaches are key goals for many teaching librarians in academia. Librarians generally develop different tools to address these goals, depending on the class, the students, and the research in which students are participating. This paper outlines a peer-to-peer interview method developed as part of a workshop for an advanced chemistry class. The goal of this activity was to improve engagement, collaboration, and critical thinking before upper-level students delve into research literature. The activity iterations as well as outcomes, observations, and overall success are described in detail.

Introduction

The challenges of teaching information literacy skills are well known to most librarians engaged in any kind of instruction in academic settings: agonizing over teaching everything in a single session, working with varying skill sets of students in the same class, encouraging critical thinking and evaluation, engaging students in the research process, effectively assessing instruction, and so forth. Librarians have done an admirable job of addressing these challenges–why they exist and how to approach them–in our professional work and in the scholarly literature. This paper presents another method of addressing two of those common challenges when working with upper-level students (junior level or above): facilitating critical thinking and engaging students in a collaborative research process.

Background and Initial Situation

Working with upper-level students in discipline-specific courses can be very satisfying for librarians. We can appreciate the chance to delve, sometimes deeply, into the scholarly

literature to help students figure out nuanced approaches to complex research topics, to use those funky niche databases, or to help students utilize a sophisticated framework when evaluating resources. Often, these upper-level students feel more assured of their research skills and are eager to dive into the resources. Yet research indicates that students often perceive themselves as more skilled than they actually are (Gross & Latham, 2007, 2009) and, even at upper-levels, students still struggle with research skills though they may perceive themselves as competent in these areas (Jackson, 2013; Molteni & Chan, 2015;). Students may also focus on the product ("I found something") rather than the process, such as creating effective search strategies or critically thinking about approaches to research (Gross & Latham, 2011). Such disconnects have sent many librarians in search of possible solutions, including the use of hands-on critical thinking and collaborative engagement activities.

In this particular situation, students in an upper-level chemistry course were required to design and conduct an experiment based on a prompt provided by their professor; this prompt was based on standard concepts for that particular chemistry specialization. The professor assigned each student to a laboratory team, generally a pair or group of three, to accomplish this goal. At the beginning of the semester, the professor and the author met to discuss a library workshop to help students as they researched potential experimental designs. Because this was an upper level class in chemistry, the professor wanted the students' experience to mimic a more realistic "working chemist" situation. Thus, she required students to use research literature and other scholarly sources as part of the design process. Use of textbooks and laboratory workbooks was not permitted. Based on these requirements, the inaugural workshop included an introduction to research sources specific to the discipline as well as those suitable for researching advanced chemistry topics. The workshop also included effective search strategies guidance and

hands-on research time. Students worked together in their lab teams and both the professor and the author circulated to address disciplinary and resource questions.

After several semesters of conducting workshops organized in this manner, the professor and the author met to discuss improvements to the workshop and persistent problems encountered by the students. We agreed that the most glaring issues observed were the rush to search online without a search strategy in place as well as a lack of collaboration within lab teams. Students also were not demonstrating consideration of their existing disciplinary knowledge. For example, a student may have learned in a previous class that a specific law or calculation is germane to a reaction or outcome, but neglect to remember to use that law or calculation as a consideration during their search process (e.g., as a keyword).

Those three things together resulted in multiple searches by individual team members with few on-point results. The latter aspect–neglecting their existing knowledge–also came with an unanticipated drawback. Students, together and individually, spent more time than planned talking to their professor about the chemistry related to the topic. In these exchanges, the professor prompted the students, through focused questioning, to think about chemistry concepts they already knew and how they might use that knowledge as they searched for approaches to the experimental design.

We also observed a lack of engagement in many teams during these strategy sessions. On the surface, it appeared that stronger students and/or outspoken students dominated the research process, a well-known group dynamic occurrence (Channon, David, Goode, & May, 2017; de Grave, Dolmans, & van der Vleuten, 2001). Reticent students were not necessarily getting the opportunity to be heard or to contribute, and some weaker students were not engaging very actively with the experimental design. In some instances, this disconnect resulted in a laboratory

team that lacked a clear picture of what they all knew, did not know, or needed to know, since they weren't actively engaging with one another.

Initial Approach

After identifying these consistent issues, we devised two new goals and modified the instructional approach. The two goals were a) to get students to focus on their topics and the background information they already knew *before* beginning any online searching and b) to build a process that encouraged more equitable contributions from each team member. To accomplish both goals, the revised workshop included a beginning-of-class activity: a structured interview using a short list of guided questions.

Designed to be a short, time-limited activity, this interview engaged students with both their topic and one another by using a student-to-student method where one person served as the interviewer and the other as the researcher. The interviewer asked a series of questions (Table 1) and recorded the responses while the other person–identified as the researcher–focused solely on answering. We allowed just ten minutes for the interview to encourage the class to move along in a timely fashion and did not permit any consultation of electronic resources. Once the ten minutes elapsed, the interviewer and the researcher switched roles. We also mixed interview partners; interviews did not happen between people working on the same experiment. This change ensured everyone had an opportunity to contribute and helped individuals clarify what they did or did not understand.

Once interviews were complete, lab partners regrouped and used their interview notes to discuss their initial thoughts. Students then identified potential keywords from the interview to use as initial search terms. They also used interview questions to pinpoint resources they might use for searching the research literature.

Initial Iteration Guided Interview Questions

We designed the initial questions to encourage as much critical thinking as possible by students (Table 1). Initial questions were framed broadly to encourage critical thinking and to discourage students' tendencies to jump to hasty conclusions. Students were reassured that there were no right or wrong answers and they were encouraged to say "I don't know" if they really did not have a response for a specific question. They were also informed that they would not be turning in the interviews; they were solely an aid for the workshop.

Outcomes and Observations

The first iteration of the student-to-student interview process was a definite improvement from the previous workshops and we repeated it over the course of several semesters. As we hoped, the interview exercise engaged students with their topic and colleagues in a thoughtful way. This activity enabled students in the researcher role to free think and delve into their existing understanding of the chemistry involved; researchers were also not distracted by the urge to write "correct" answers in nice, neat sentences when pondering their own topic. Some interviewers prompted researchers for more information or clarification when a response was unclear, which further facilitated the critical thinking process for researchers. In the laboratory teams, each member now had something to contribute and discussions of interview results within teams were more common. These contributions helped ameliorate undesirable dynamics that can occur in group settings, such as unequal participation and lack of interaction (de Grave, et al. 2001). The separate→interview→regroup method also helped identify individual and shared areas of misunderstanding or weakness at the outset of the workshop.

While the peer-to-peer interview was an improvement over the previous class design, issues with the workshop and activities emerged. Some questions were repeatedly perceived as

too vague by students. Students had difficulty answering these effectively or, as in the case of the resources question, unfamiliarity with question's topic yielded less robust answers. This confusion meant that the amount of information collected during the interviews still varied widely and therefore individual contributions to the team remained less equitable than desired. We also found that some students struggled with identifying keywords appropriate to use in the search strategies later discussed in the workshop.

Second Iteration

After several semesters using the original activity, we met to discuss the state of the workshop, adjust goals, and reconsider the activities. Our observations, outlined previously, highlighted the need to rework the specificity of questions, to omit resource questions, to provide examples, to prompt for existing knowledge, and to separate identifying potential search keywords and phrases into a discrete exercise. Tables 2 and 3 reflect those changes.

In addition to those changes, we decided to require more collaboration within the interview teams. Some idea exchange had occurred, generally when an interviewer asked a researcher to clarify a response, but also when an interviewer suggested several strategies or ideas to the researcher once the interview finished. However, this back-and-forth was not widespread among interview teams. To foster this type of exchange, we decided to require the individuals within interview teams to complete the keyword table exercise together (Table 3). Students filled out their own tables, generally within five or fewer minutes, and then swapped tables with the people who interviewed them. The exercise then repeated. This activity enabled teams to provide ideas for themselves and for their colleagues that enhanced collaboration among the class as a whole.

Questions and Tables

Reworked questions in the second iteration were still framed broadly. As with the initial iteration, students were reassured there were no right or wrong answers, that they should answer honestly, and that the questions and answers were in aid of the workshop and not for grading purposes. Table 2 includes the second version of the interview questions. The keyword exercise is in Table 3.

Outcomes and Observations

Once again, we repeated this workshop over several semesters and noted further student improvement. Refining the wording and examples resolved some vagaries students encountered. Another revision, adding questions pertaining to existing knowledge, also benefitted students; we observed that these questions generally resulted in more thoughtful answers. The biggest change, separating the keyword exercise (Table 3), further encouraged critical thinking and served as a good reference for search keywords for both individuals and teams. The idea exchange aspect of the keyword table activity also addressed disparities in participation and ensured some level of collaborative participation from each person in the workshop.

While the second iteration of the peer-to-peer interview improved most aspects of the workshop, students still struggled with some questions. Many students, for example, thought general terms such as “concept” and “objective” were too nebulous. This perception resulted in students focusing on word semantics rather than chemistry concepts related to the project. It became clearer, too, that we needed the next iteration to include certain critical considerations of the discipline that students repeatedly neglected to consider during their interviews and search activities: measurements, calculations, equations, and governing laws.

Third Iteration

The third iteration of the workshop underwent revisions to address the aforementioned issues: vague wording and the absence of questions or terminology specific to measurements, calculations, equations, and governing laws. To resolve the ambiguity, we substituted discipline-specific wording for conceptually broader terms in the interview (Table 4) and in the keyword table exercise (Table 5). In both the interview and the keyword table, we added prompts regarding measurements, calculations, equations, and laws. The keyword exercise (Table 5) update designated categories for narrower and broader terms as well as a category for any laws, equations, or calculations that applied to the chemistry of the experimental design. We made no further changes to enhance engagement; the previous approach was satisfactory in that area.

Questions and Tables

Table 4 includes the reworked interview questions; we organized these similarly to previous iterations. The keyword exercise, Table 5, differs significantly from the previous keyword exercise table in both wording and table arrangement. Upon distribution of both activities, we again provided students verbal reassurance regarding "correctness" of answers, honesty of response, and irrelevancy of exercises to grading.

Outcomes and Observations

The current iteration further improved critical thinking within the workshop at the team and individual levels. The increased specificity of terminology reduced the number of "what do you mean" responses during the interviews. We also observed that students were more likely to bring their own knowledge to bear once the questions utilized more specific wording. In addition, obliging students to consider laws, measurements, and so forth, generally resulted in more effectively designed search strategies and thus in more on-point results when they searched

the literature. The revisions to the interview and keyword table also helped collaboration within lab teams as each member now had concretely outlined some understanding or idea, which contributed to the team's overall knowledge. The revisions also resulted in quicker and simpler identification of inquiry problems. For example, it was easier to identify whether the team had a thorough grasp of chemistry related to the project or if they had compiled effective search keywords before they searched the literature.

Discussion

When we initiated these activities, it was with the goals of improving the quality and effectiveness of the workshop for students and encouraging active collaboration within lab teams. By the final iteration, student-to-student interviews and keyword tables fostered critical thinking, topic engagement, and collaboration. Critical thinking about experiment design flourished and many students achieved research success during the workshop.

To attain effectiveness with this method, this librarian would recommend keeping a few key considerations in mind during the planning process. First, consider the level of detail appropriate for the class. Using vague terminology was an obstacle for students. We erred on the side of non-specificity for too long, primarily to avoid a narrow interpretation by students. However, students considered several key terms too nebulous, which created confusion. We also found that providing examples of answers gives students a framework to use as they form responses. A combination of clear-cut wording and examples worked effectively; do not underestimate its appropriate deployment.

Breaking an activity into smaller, discrete units and setting reasonable time limits for these activities provide additional considerations. We found that dividing the initial activity into two pieces, the interview and the keyword table exercise, benefitted the students by not

overwhelming them with too many things at once. In addition, placing these exercises at the very beginning of the workshop and time-limiting each section resulted in enough time for engagement without slowing the class unnecessarily.

We anticipate continued iterations as we refine and respond to observed student needs. While we will continue to assess the workshop using informal observation, a more formal assessment of the workshop's effectiveness is a likelihood, particularly those aspects related to team collaboration.

Conclusion

Students face many challenges as they strive to become critically-thinking, information-literate individuals and those challenges will likely remain in the future. However, like the collaborative interview activities described in this paper, librarians use of effective tools can help address these challenges and facilitate students' understanding of information: how to find it, use it, evaluate it, and relate it to what they already know. Librarians' use of informal assessment, as described in this paper, and commitment to continually improving of new approaches and tools also benefits students. When librarians commit ourselves to this, we better learn and address how and what students actually understand.

References

Channon, S.B., Davis, R.C., Goode, N.T., & May, S.A. (2017). What makes a 'good group'? Exploring the characteristics and performance of undergraduate student groups. *Advances in Health Science Education*, *22*, 17-41. doi:10.1007/s10459-016-9680-y

de Grave, W. S., Dolmans, D. H., & van der Vleuten, C. P. (2001). Student perceptions about the occurrence of critical incidents in tutorial groups. *Medical Teacher*, *23*, 49-54. doi:10.1080/0142159002005596

Gross, M., & Latham, D. (2007). Attaining information literacy: An investigation of the relationship between skill level, self-estimates of skill, and library anxiety. *Library & Information Science Research. 29,* 332-353. doi:10.1016/j.lisr.2007.04.012

Gross, M. & Latham, D. (2009). Undergraduate perceptions of information literacy: Defining, attaining, and self-assessing skills. *College & Research Libraries*, *70*, 336-350. doi:10.5860/0700336

Gross, M. & Latham, D. (2011). Experiences with and perceptions of information: A phenomenographic study of first-year college students. *Library Quarterly, 81,* 161-186.

Jackson, C. (2013). Confidence as an indicator of research students' abilities in information literacy: a mismatch. *Journal of Information Literacy*, *7*, 149-152. doi:10.11645/7.2.1848

Molteni, V. E. & Chan, E. K. (2015). Student Confidence/Overconfidence in the Research Process. *Journal of Academic Librarianship*, *41*, 2-8. doi:10.1016/j.acalib.2014.11.012

Table 1. First Iteration Interview Questions

1. Can you please describe the basic concept(s) of your project?
2. How would you explain these concepts in other ways? For example, if you had to explain what your experiment is about to your mom or dad, what would you say? How would you describe it to them?
3. What don't you know at this point (besides exactly how you are going to perform this experiment)? What's unclear?
4. What keywords or key phrases do you think you'll use for searching information?
5. What databases, books, electronic resources, or journals do you plan on using for your research?
6. Can you think of ways to expand your project to show a trend or make comparisons to different systems, rather than simply stating one value as your conclusion?

Table 2. Second Iteration Interview Questions

1. What is your project?
2. What do you know already about your objective? For example, if you were tasked to determine the molecular weight of a polymer, you might say you know that most molecular weights are measured using X method or that polymers are made up of monomers or that polymers have a high molecular weight.
3. What do you think are the two or three main concepts of your objective?
4. How would you explain these concepts in other ways? For example, if you had to explain what your experiment is about to your mom or dad, what would you say? How would you describe it to them?
5. What ideas or concepts do you think you are going to need a little more help understanding? Besides exactly how you are going to perform this experiment, what is still unclear to you?
6. Can you think of ways to expand your project to show a trend or make comparisons to different systems (rather than simply stating one value as your conclusion)?

Table 3. First Iteration Keyword Table

1. Write your research statement or question here (in a full sentence). (1 minute)
2. Brainstorm and list synonyms and terms related to your topic. (2 minutes)

3. Exchange sheets with your interviewer and allow them to list their search term ideas here. (2 minutes)

Table 4. Third Iteration Interview Questions

1. What is your project?
2. What do you know already about the chemistry related to this project? For example, if you were tasked to determine the molecular weight of a polymer, you might say you know that polymers are made up of monomers or that polymers have a high molecular weight.
3. Without simply repeating your project title, describe your end goal. For example, finding a specific constant or a particular type of energy, etc. Can this be measured directly? If so, how do you measure it? If not, how will you calculate it?
4. How would you explain this chemistry in other ways? If you had to explain what your experiment is about to your mom or dad, what would you say? How would you describe it to them?
5. What don't you understand about this project (besides your exact experimental methodology)?
6. Can you think of ways to expand your project to show a trend or make comparisons to different systems (rather than simply stating one value as your conclusion)?

Table 5. Second Iteration Keyword Table

What is your project?

List the two main chemistry concepts related to your experiment in the boxes below.

Also list any laws, equations, or calculations that apply to your experiment.

Concept 1	Concept 2	Laws/Equations/Calculations
Broader Terms	Broader Terms	
Narrower Terms	Narrower Terms	

Trade this sheet with your interviewer.