



Interdisciplinary Collaboration and Library Instruction: A Case for Lesson Study

Alexander Deeke, John Kotnarowski, Kirsten M. Feist,
and Jin Pennell

abstract: This article analyzes how the methodology *lesson study* impacts instructional design decisions and interdisciplinary collaborations in the context of one-shot library instruction. A team of two academic librarians and two course faculty utilized lesson study over the course of a year to develop and revise a library instruction lesson plan for an undergraduate English as a second language course. Data collected via class observations and team meeting notes were analyzed using reflective thematic analysis. The results of the reflective thematic analysis and the authors' experiences reveal that lesson study promotes pedagogical strategies that increase student engagement in the classroom while simultaneously improving communication and knowledge-sharing practices between interdisciplinary lesson study team members.

Introduction

Librarians and course faculty have long collaborated to design one-shot library instruction sessions, often resulting in library instruction that better meets student and curricular needs. An important aspect of these collaborations is the relationship itself and how both parties navigate disciplinary differences in teaching and information literacy. This article aims to focus on the relationship aspect of interdisciplinary collaborations between librarians and course faculty through the lens of the Japanese collaboration method *lesson study*.

Lesson study is a collaborative methodology designed for a group of teachers to learn from one another and improve their teaching by developing, assessing, and reflecting on a lesson plan for a single class session.¹ The methodology falls under the umbrella of

Scholarship of Teaching and Learning (SoTL) as it contributes to SoTL's overarching goal of improving student learning through evidence-based analysis of teaching practices.² Lesson study is unique within SoTL by intentionally elevating teacher development to the same importance as student learning. It's also unique in its focus on a singular lesson plan. This focus aligns with library instruction from both a practical and conceptual perspective as many librarians often design, teach, and assess single lesson plans due to the prevalence of the one-shot model. In addition to its natural alignment with one-shot instruction, lesson study offers the potential value of cultivating deeper relationships between those who participate in lesson study teams, a value that could translate to relationships between librarians and course faculty.

Cultivating relationships with course faculty is an essential aspect of librarianship as evident in the size and scope of literature written on the importance of relationship building.³ One of the most common points of interaction between course faculty and librarians is library instruction, suggesting that instruction contains greater opportunity and potential for relationship building.⁴ A few librarians have recognized the potential of lesson study in cultivating instruction-based relationships with course faculty.⁵ Case studies reporting on the impact of lesson study in library instruction find that the method improves the quality of one-shot library instruction sessions, increases collaboration among teachers, and provides valuable assessment data.⁶ Despite reports of lesson study as beneficial for librarians, adoption remains lower in librarianship compared to its growth in adjacent fields like K-12 education, mathematics education, and teacher development.

This article continues the tradition of case studies by reporting the results of a year-long lesson study in which a team of librarians and course faculty designed a one-shot library instruction session for undergraduate English as a second language (ESL) students. Three research questions guided this case study:

1. Does the lesson study process aid in identifying and effectively addressing learning needs of undergraduate English as a second language (ESL) students in the context of one-shot library instruction?
2. How does the lesson study process influence instructional design decisions?
3. In what ways does the lesson study process influence the relationship between librarians and course faculty?

The authors employed a novel approach in lesson study research by applying reflective thematic analysis on their observation and meeting notes to answer the research questions. The discussion of the analysis coupled with the authors' experiences aims to demonstrate how lesson study provides unique insight into ESL student learning needs, promotes instructional design decisions rooted in active learning, and deepens librarian-course faculty relationships through mutual recognition and productive exchange of subject matter expertise. Additionally, this case study presents a framework and best practices to aid future librarians in utilizing lesson study effectively.



Literature Review

The roots of lesson study are based in Japan where it has developed into one of the primary SoTL methodologies since the 1950s.⁷ It was introduced in the 1990s to Western audiences, where it is steadily growing in popularity, particularly in elementary education, mathematics education, and teacher development.⁸ Lesson study took longer to arrive in higher education, but its use is increasing in individual and institutional teaching practices.⁹ The primary benefit of the lesson study methodology is that it challenges teachers in their assumptions and perspectives while simultaneously promoting collaboration. Lesson study creates a dynamic wherein teachers must listen and consider viewpoints about teaching and pedagogy that may differ from their own perspectives.¹⁰

The benefits of lesson study for teacher development and student learning are well documented in the literature. Wide-scale application of lesson study can benefit entire educational systems, as most notably seen in the shift from a teacher-centered approach to a student-centered approach in the Japanese educational system.¹¹ Smaller scale applications by groups of teachers and researchers are more common in the Western educational context. A review of over two hundred applications of lesson studies revealed that teachers who participate in lesson study increase in their ability to collaborate with other teachers, focus more on student learning, and gain deeper understanding of pedagogy, all of which, in turn, leads to greater learning outcomes for their students.¹² The result of teachers confronting and building up each other's pedagogies and perspectives is best summarized by Bill Cerbin's definition: "[L]esson study is a method through which teachers can build the kind of pedagogical content knowledge that could not only improve their own teaching but move the practice forward in their fields."¹³

Lesson study can be difficult to master, particularly in educational settings outside of Japan.¹⁴ Time is often the biggest challenge, as a lesson study requires multiple meetings among team members both before and after observing the lesson.¹⁵ Non-Japanese lesson study teams also often struggle to include all aspects of a lesson study, with a significant number of lesson studies failing to identify a research theme, engage with an outside expert (koshi), or share knowledge with another lesson study team.¹⁶ Sonal Chokshi and Clea Fernandez aptly define the challenge of lesson study as "easy to learn but difficult to master" in their review of lesson studies in the United States.¹⁷

Lesson Study & Library Instruction

The literature on lesson study in the context of library instruction is less developed than in other education-adjacent fields but does include a selection of case studies featuring successful implementation of lesson study in both academic and school libraries. Librarians report positive changes to their instructional practices such as transitioning away from lecture-based learning toward active learning, increasing self-reflection on teaching

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styles, and developing practices to better encourage student participation as a result of participating in lesson study.¹⁸ Lesson study is also helpful in identifying students' information literacy needs while making the creation and revision process of lesson plans easier due to factors such as increased collaboration among instructors, representation of diverse viewpoints, and the ability to make evidenced-based changes.¹⁹ The interdisciplinary approach common to many library instruction lesson study teams is viewed as a unique strength, as different viewpoints improve understanding of student learning and information needs resulting in more effective lesson plans.²⁰ Interdisciplinary lesson study teams also report improved collaboration between librarians and course faculty resulting in long-term benefits. Long-term benefits include increased librarian involvement in curricular work, the development of shared language and expectations of library instruction to course content, and deeper relationships among stakeholders based on shared pedagogical interests.²¹

Challenges to implementing lesson study are underexplored in library instruction literature, with one study noting difficulty finding enough time for library instructors to participate and another commenting that institutions that value teaching as part of promotion and tenure may be more open to dedicating time and resources to lesson study than institutions that place less value on teaching.²² The paucity of information regarding lesson study in library instruction literature may also reflect a lack of awareness among librarians, particularly among academic librarians, due to the slower integration of lesson study in higher education than in the K-12 context.

Library Instruction & ESL

There is a long and deep history of library instruction for ESL students over the past fifty years.²³ Approaches to teaching ESL students slowly progressed away from a deficit model as librarians focused more on understanding the nuances of ESL student information needs and increased collaborations with ESL course faculty.²⁴ Librarians have partnered with ESL course faculty to help students bridge gaps between Western and non-Western academic expectations, scaffold information literacy concepts and integrate library instruction in course curriculum, and support embedded librarianship for ESL students.²⁵ The librarian-course faculty partnership is increasingly seen as a key factor to supporting ESL students as noted in studies on information literacy acquisition, research topic selection, and keyword development among ESL students.²⁶ It is also argued that librarian and ESL course faculty share multiple commonalities ranging from educational backgrounds and status within universities, to learning goals and teaching frameworks that help make collaboration both natural and mutually beneficial for both parties.²⁷ There is no evidence in the literature of librarians and ESL course faculty utilizing the lesson study methodology to develop library instruction. This gap suggests that lesson study is a new way for librarians and ESL faculty to grow in their partnership and support ESL student learning needs.

The present study builds on the literature in many ways. First, it explores why lesson study is an appropriate framework for promoting successful interdisciplinary relationships by offering future lesson study practitioners a better understanding of how the relationship-building process influences instructional design decisions. Second, the



method used to explore the relationships between interdisciplinary lesson study team members, reflexive thematic analysis, is novel in lesson study research thus providing a new method to apply in future lesson study research and practice. This article introduces lesson study as a new collaboration method for librarians serving ESL students. The authors also outline best practices and lessons learned with the goal of addressing barriers that may limit librarians from participating in lesson study. Finally, the article provides a path forward that will help increase the methodology's usage and study in library instruction.

Background

The case study took place in an academic writing course focused on source-based research and writing skills for first-year international undergraduate students, which fulfilled a general education requirement at a large research university. Approximately 110 students enroll in the course based on their English proficiency placement test and are divided over eight or nine sections each semester. The course mostly enrolls degree-seeking international students, some exchange or non-degree seeking students, and US citizens or permanent residents whose first language is not English. This paper occasionally uses the phrase "English as a second language" or "ESL" in accordance with the language used by the authors' university for the course chosen for the lesson study. However, the authors recognize "ESL" as a phrase that does not fully encompass the experiences of all students in the course, and the terms "English language learners" and "multilingual students" could also be appropriate to apply in this context.

The learning outcomes for this course include students developing a research question, searching library databases, evaluating and synthesizing sources, and avoiding plagiarism while integrating sources. Library instruction is provided, using a one-shot model, when students begin working on an annotated bibliography for their research paper topics. Prior to the library class, students are instructed to complete a worksheet summarizing their research topic and identifying main and alternative keywords. Then, a member of the library instruction team, which consists of two academic librarians and ten graduate assistants, teaches an in-person class using a standardized lesson plan. The instruction sessions for all ESL sections are all delivered on the same day, with the goals of familiarizing students with library resources and promoting proficiency in the use of library databases.

Library instruction for the course was well-established at the time of the case study. The two librarians on the library instruction team serve as liaisons to the ESL department and met regularly with two

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course faculty in order to successfully implement library instruction. The librarians decided to revise the library session lesson plan over the summer of 2022 to transition from online instruction to in-person instruction at the close of the COVID-19 pandemic and approached the course faculty to collaborate with them on this process. The long-standing relationship among all parties made collaboration possible and allowed for a shared vision of potential improvements to the lesson plan, such as efficiency with class time, increasing student engagement, better accommodating students with lower English proficiency, and improving learning outcomes assessment. While the long-standing relationship made this collaboration possible, this was the first time librarians invited course faculty as full partners in developing the lesson plan, so it was important to the librarians to find a framework to help guide the process. Lesson study was selected after a literature review; all parties viewed the approach as a productive and equitable process. It is also important to note that the course faculty held administrative roles within their department providing them with autonomy to work on the lesson study as well as the authority to implement findings throughout the course.

Lesson Study Process

The lesson study took place over the course of a year with the authors collaborating to design and assess an updated library instruction lesson plan. The lesson study was organized into eight phases based on previous lesson studies reviewed in the literature as noted in Table 1.²⁸ During the first two phases, the lesson study team met numerous times to review the existing lesson plan and modify the learning outcome to better reflect the aim of the library session and its placement within the course curriculum. The team then followed backward design principles to create an assessment that would measure student learning and to update the content that was being taught. More details on the development of the lesson study process itself can be found in Alexander Deeke et al.'s 2023 ACRL conference proceeding "Fostering Interdisciplinary Collaboration via Lesson Study."²⁹

Data Collection

The newly designed lesson plan created via lesson study was implemented in all sections of the course, with one selected each semester for observation. The lesson study team modified an observation form found in the literature to record student behavior.³⁰ One section of the form outlined the lesson plan, another was pre-filled with expected student behaviors, and the final section contained observer notes, all of which can be found in Appendix A. Observations of student learning took place during phases three and five of the lesson study.

During phase three, which took place in fall of 2022, one of the librarians taught the newly designed lesson plan, while another team member assisted as the instructor of record for the class. The remaining two team members sat in different parts of the classroom to observe the students and record their notes using the observation form. Thirteen of 15 students consented to being observed. In phase five, which took place in spring of 2023, the second librarian taught the revised lesson plan while the remain-



Table 1.
Lesson study phases

Phases	Tasks
Phase 1	Create community guidelines and identify research focus
Phase 2	Research and plan the lesson
Phase 3	Teach and observe the lesson
Phase 4	Post-lesson discussion, data analysis, and lesson plan revision
Phase 5	Teach and observe the revised lesson
Phase 6	Post-lesson discussion, data analysis, and further revision of the lesson plan
Phase 7	Analyze instructor observation and reflection data
Phase 8	Disseminate results

ing three team members observed. Nine of 14 students consented to being observed in the spring. The authors received an exemption from their Institutional Review Board to observe students during the lesson study and diagrams of how observations were conducted can be found in Appendix B.

The lesson study team met after both phases to share their observations, review assessment data, and update the lesson plan as phases four and six of the lesson study. The lesson study team took notes during the post-observation meetings to record their thoughts and review how each library session went for future analysis.

Data Analysis

The authors conducted a reflexive thematic analysis on information recorded in the observation forms and from the post-observation discussion notes to examine how the lesson study process influenced instructional design decisions throughout the case study. Reflexive thematic analysis is a derivation or type of thematic analysis which is described by leading proponents Virginia Braun and Victoria Clarke as “an umbrella term for a set or family of approaches for analyzing qualitative data that share a focus on developing themes (patterns of meaning) from qualitative data.”³¹ Themes can “come both from the data (an inductive approach) and from the investigator’s prior theoretical understanding of the phenomenon under study (a priori approach)” which are similar to inductive and deductive approaches.³²

Working both inductively and deductively, the authors adapted Braun and Clarke’s derivation of thematic analysis, reflective thematic analysis, that works “within a range of theoretical frameworks,” including those that allow for observed behavior to answer a research question.³³ Braun and Clarke’s reflective thematic analysis uses six recursive phases, including:

1. Familiarizing with the data,
2. Coding,
3. Generating initial themes,
4. Developing and reviewing themes,
5. Refining, defining, and naming themes, and
6. Writing Up.³⁴

The authors followed a similar, though amended, cycle of analysis on the collected observation data (lesson study phases three and five) and on notes from the post-observation meetings (lesson study phases four and six) to determine and quantify the elements that most informed instructional design decisions throughout the course of the lesson study. The authors also adopted data scrutiny and processing techniques developed by Gery Ryan and H. Russell Bernard of which “repetition” and “keywords in context” proved the most fruitful in the context of lesson study.³⁵ The analysis was completed using the open-source platform Taguette to identify themes and sub-themes to develop a coding hierarchy.

As illustrated in Figure 1, the resulting coding hierarchy identified four themes: *Facilitator Impressions*, *Learning Outcomes (LO)*, *Lesson Planning (LP)*, and *Observed Student Behaviors (OSB)*. Twelve sub-themes were then identified within the themes LO, LP, and OSB. Three learning outcomes were sub-themes of LO, four instructional approaches or methods were sub-themes of LP, and five student behaviors were sub-themes of OSB. The theme *Facilitator Impressions* did not include sub-themes, as it indicated the authors’ use of hedging language, such as “I wonder” or “it seems” and could not be broken down further.

Facilitator Impressions	Learning Outcomes (LO)	Lesson Planning (LP)	Observed Student Behaviors (OSB)
	LO1 Keywords	LP1 Building in More Engagement/Interaction	OSB1 Collaboration
	LO2 Search Strategies (Academic Search Ultimate)	LP2 Clarity of Instructions	OSB2 Confusion
	LO3 Search Strategies (Google Advanced Search)	LP3 Defining Terms	OSB3 Engagement
		LP4 Sequencing/Timing	OSB4 Familiarity with Concepts and Tools
			OSB 5 Surprises

Figure 1. Coding hierarchy.



The coding hierarchy was used to analyze data to provide insight on the themes and sub-themes that had the greatest impact on instructional design decisions throughout the lesson study. The coding hierarchy and analyzed data were normed for interrater reliability.

Results

The reflective thematic analysis coding hierarchy was applied to observation data collected in lesson study phases three, four, five, and six via Taguette to identify the number of instances each sub-theme appeared. A total of 445 tags were applied to the data across phases three through six, including cross-tagged comments, as noted in Table 2. The authors then identified two themes, *Facilitator Impressions* and *Learning Outcomes*, one sub-theme, *Clarity of Instructions*, and a combination of two sub-themes, named *Student Engagement*, as most greatly influencing instructional design decisions during the lesson study process based on the results. Descriptions of each theme and sub-theme can be found in Appendix C.

Student Engagement

The sub-themes *OSB3: Engagement* and *LP1: Building in More Engagement/Interactivity* were highlighted 129 times, representing 29 percent of all observations and transcribed meeting notes. The authors named the combined sub-themes *Student Engagement* since both were related to the shared goal of increasing engagement with LP1 from a lesson planning perspective and OSB3 from an observed student behavior perspective. Content tagged as LP1 identifies instances where the lesson study team reflected or commented on the inclusion or implementation of participatory elements in the lesson plan whereas OSB3 notes observations or discussions of how students did or did not engage during participatory portions of the lesson plan. Examples of how student engagement was commented upon in the data include:

- "...poll about Google vs Library databases, maybe a better way to do that as it felt clunky"
- "... there was some peer pressure from the hands raised part but like the raised hands."

Engagements tagged as *Student Engagement* provided information about how the inclusion or omission of activities in the lesson plan to promote student engagement (LP1) were received in practice by students (OSB3) during the instruction itself. Tagged content of *Student Engagement* increased as the lesson study progressed from phases three and four to phases five and six, indicating increased attention to this aspect from the lesson study team.

Learning Outcomes

The theme *Learning Outcomes (LO)*, including *LO1: Keywords*, *LO2: Search Strategies (Academic Search Ultimate)*, and *LO3: Search Strategies (Google Advanced Search)*, was commented upon 79 times (18 percent). *Learning Outcomes* reflect times the lesson study

Table 2.
Reflective thematic analysis data

Themes	Sub-Themes	Phase 3	Phase 4	Phase 5	Phase 6	Sum
Facilitator Impression Learning Outcomes	N/A	n=22	n=20	n=17	n=9	$\Sigma=68$
	LO1 Keywords	n=8	n=4	n=18	n=0	$\Sigma=30$
	LO2 Search Strategies (Academic Search Ultimate)	n=7	n=6	n=13	n=0	$\Sigma=26$
	LO3 Search Strategies (Google Advanced Search)	n=7	n=8	n=8	n=0	$\Sigma=23$
Lesson Planning	LP1 Building in More Engagement/Interaction	n=1	n=2	n=7	n=7	$\Sigma=17$
	LP2 Clarity of Instructions	n=6	n=4	n=34	n=4	$\Sigma=48$
	LP3 Defining Terms	n=3	n=1	n=6	n=0	$\Sigma=10$
	LP4 Sequencing/Timing	n=4	n=11	n=14	n=6	$\Sigma=35$
Observed Student Behaviors	OSB1 Collaboration	n=7	n=1	n=11	n=0	$\Sigma=19$
	OSB2 Confusion	n=7	n=7	n=17	n=2	$\Sigma=33$
	OSB3 Engagement	n=32	n=13	n=56	n=11	$\Sigma=112$
	OSB4 Familiarity with Concepts and Tools	n=7	n=5	n=4	n=0	$\Sigma=16$
	OSB5 Surprises	n=1	n=6	n=1	n=0	$\Sigma=8$

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team observed student behaviors, comments, questions, or activities directly related to aspects of the lesson study learning outcome, “Students will learn how to develop keywords and search strategies to find trustworthy sources for their research assignment in both Google and Academic Search Ultimate.” Examples of observations connected to this theme include:

- “...explaining each part of Google Advanced search (‘all these words’ through ‘none of these words’) seemed to take a while and I’m not sure what impact it had on students.”
- “One mentioned the ease of being able to see the author’s credentials in the database search, being able to limit the types of sources.”

Tagged content related to *Learning Outcomes* appeared in phases three through five, but, interestingly, did not appear in phase six. The lack of tagged content in phase six indicates that the lesson study team did not discuss aspects of the lesson plan’s learning outcomes, such as observed student behavior or future revisions to the lesson plan, during their final post-lesson discussion. Pairing phase six findings with the high number of tags in phase five may suggest that the revised lesson plan met the learning outcome to such an extent that the lesson study team deemed that no further revisions were necessary.

Clarity of Instructions

LP2: Clarity of Instructions was commented upon 48 times (11 percent). Clarity of instructions reflect instances where the research team commented on or observed student behaviors related to the library instructor’s ability or inability to convey directions during the lesson. Two examples of observations include:

- “...a few students got stuck getting here-needed help navigating to right place.”
- “... clear instructions, clear pace helps students follow along.”

These observations helped the lesson study team recognize areas to both improve the original lesson plan and note improvements when observing the revised lesson plan. The attention on the latter can be noted in the high number of instances found in phase five (34 tags) which was greater than the sum of tags in phases three, four, and six.

Facilitator Impressions

The theme *Facilitator Impressions* was mentioned 68 times (15 percent). This theme indicates the study team’s use of hedging language and was generally cross-tagged with other sub-themes that more directly influenced design decisions. Examples of hedging language include phrases such as, “I wonder” and “it seems.” The frequency of hedging terms decreased by approximately 24 percent between phases three and four and phases five and six. This reduction of *Facilitator Impressions* tags as the lesson study progressed potentially indicates greater study team confidence making definitive statements as they gained proficiency in the lesson study process.



Discussion

Reflective thematic analysis of observation data and post-observation meeting notes from this case study suggest that the lesson study methodology promotes pedagogical strategies that support student learning while simultaneously strengthening collaboration among instructors.

Supporting Student Learning

The reflective thematic analysis highlights the focus lesson study brings to observing how students engage during an instruction session, as the sub-themes identified for the themes *Lesson Planning (LP)* and *Observed Student Behaviors (OSB)* all relate to promoting student engagement. The fact that these sub-themes emerged during the analysis indicates the particular attention lesson study places on elevating student engagement which, in turn, influences instructional design decisions toward improving student engagement. In particular, the themes *Clarity of Instructions* (48 total mentions), *Sequencing/Timing* (35 total mentions), and *Building in More Engagement/Interactivity* (17 total mentions) were prioritized during the discussions that guided revisions to make the session as engaging as possible for students. The aforementioned frequencies also connect clearly with the top two Observed Student Behaviors (OSBs): *Engagement* (112 total mentions) and *Confusion* (33 total mentions). As they observed each session, the lesson study team looked for examples of students who were on-task, focused, and participating well, as well as examples of students who self-identified as confused or who appeared to be. Subsequent revisions focused on ways to promote student engagement and any aspects of the lesson plan that were observed to impede engagement or generate confusion were reexamined during the post-observation discussions in phases four and six.

These results are consistent with other library instruction lesson studies that found an increased focus on active learning and promoting student participation, suggesting that lesson study aligns well with educational pedagogies that emphasize active

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learning.³⁶ The data from the present study demonstrate that observations focused on students' ability to participate in an engaging way. This mirrors how active learning pedagogies encourage students to be active participants in their classroom learning.³⁷ Noting occurrences of student confusion during an activity or due to unclear instructions aids instructors in understanding how to better facilitate active learning. The ability to observe and note student confusion is particularly helpful for librarians teaching ESL students, as doing so may help librarians improve the clarity of their instructional practices as well as the way they engage these students.



Strengthening Collaboration

The analysis also supports findings from the literature that lesson study strengthens collaborations between interdisciplinary instructors, particularly by increasing instructor knowledge and improving collaboration.³⁸ Evidence of increased instructor knowledge in the reflective thematic analysis can be found in phase five, which features the greatest number of mentions related to LP sub-themes like *Clarity of Instruction*, *Defining Terms*, and *Sequencing/Timing*, as well as OSB sub-themes of *Collaboration*, *Confusion*, and *Engagement* compared to other phases. The authors believe the increase corresponds to an increased calibration among the lesson study team's perception of what student engagement looks like during a library session and, relatedly, practices that promote engagement. This finding aligns well with lesson study's underlying principles, as lesson study teams spend a considerable amount of time discussing student learning during phases one and two and learn more during the observation and discussion in phases three and four.³⁹ Phase five is also notable for a decrease in the number of OSB *Surprise* mentions, a change that again attributes to greater team member alignment during the revision process and delivery of the lesson based on their increasing understanding of their students.

In addition to increasing instructor knowledge, the theme *Facilitator Impressions* that emerged from the reflective thematic analysis suggests that lesson study increases direct communication among lesson study team members. Hedging expressions noted in the data decreased over the course of the project from 22 and 20 uses in phases three and four, respectively, to 17 and 9 uses in phases five and six, respectively. The authors believe that the reduction of hedging expressions demonstrates how lesson study's reflexive process and orientation toward group discussion improves communication by engendering a sense of confidence in the participants and helping them feel more comfortable expressing themselves candidly. The expectation of participating in lesson study is to share and, the more sharing that takes place, the easier it is to communicate meaningfully, unencumbered by doubt, and less constrained by formalities or etiquette. The reduction of hedging expressions demonstrates that the discussion and dialogue required to facilitate a successful interdisciplinary collaboration became clearer, more direct, and, ultimately, more efficient due to lesson study.

Lesson Study Team Experience

In addition to the findings from the reflective thematic analysis, the authors also noted unique benefits as a result of their own experience participating in the lesson study, particularly from an interdisciplinary perspective. The authors found that the lesson study process enabled them to more effectively revise the lesson plan by balancing their own subject matter expertise with observed student behaviors. The iterative revision process of lesson study helped the authors make more changes based on evidence gleaned from observation rather than relying on more impressionistic suggestions offered at the start of the project that were often rooted in their own subject matter expertise. Each author could point to something that had been observed as a reason for making a change and this shared experience facilitated the enactment of meaningful revisions.



The iterative revision process of lesson study helped the authors make more changes based on evidence gleaned from observation rather than relying on more impressionistic suggestions offered at the start of the project that were often rooted in their own subject matter expertise.

Additionally, the development of clear communication practices encouraged by lesson study practitioners, such as developing a community agreement and a shared observation form, encouraged the authors to share openly and with increasing candor as the lesson study progressed.⁴⁰ The community agreement and lesson study framework also helped each member of the team articulate what student success looks like and provided a productive path forward to help reconcile varying conceptions into a unified vision. This process was

particularly important for the authors when determining the learning outcome for the lesson plan and developing the research foci, as both provided a foundation to build upon throughout the lesson study process.

Finally, the authors found that lesson study's focus on centering decisions on observed student behaviors allowed the authors to tap into a greater amount of subject matter expertise from each lesson study team member. For example, the initial lesson plan developed for phase three was based on recommended best practices for working with multilingual writers and teaching information literacy skills. The ESL course faculty advocated for instructional design principles based in their discipline and experience to promote active learning for ESL students, such as longer pauses when eliciting answers from students, offering instructions in simple and clear language, delivering instructions both orally and in writing, and giving additional search time during the summative assessment to allow students time to comfortably and completely demonstrate their understanding of the desired learning outcome.⁴¹ Similarly, the librarians advocated for practices rooted in information literacy, critical information literacy, and library assessment practices for teaching concepts around developing keywords and search strategies when searching for information in search engines and library databases.⁴²

Subsequent lesson revisions, however, were made possible through the observation of student behavior and reflection on what was witnessed. The authors used reflections to verify that best practices rooted in subject matter expertise were effective and, when they were not, to propose innovative changes to the lesson plan. For example, the authors incorporated a thumbs up or down activity as a quick check for student comprehension based on their subject matter expertise; however, few students were observed using the gestures with many students opting to not reply at all with a gesture. In phase four, the authors felt comfortable moving away from their own subject matter expertise to propose a new approach of checking in with students using open-ended discussion questions and encouraging students to share openly while having the library instructor write helpful answers on the whiteboard as a way of recasting information to the class. This innovative process repeated in phases four and six for revisions that the group felt warranted implementation and informed changes to the observation form on expected student behavior in phase five.



Implications

There are several implications and best practices for future lesson study teams and librarian-course faculty partnerships that result from this case study. First, librarians should consider lesson study as a useful method for collaboration on library instruction and deepening their relationships with course faculty. Course faculty see library instruction as an entry point to collaborating with librarians, and the fundamentals of lesson study correspond well to the one-shot model.⁴³ Interdisciplinary collaboration can be a challenging endeavor; however, the lesson study methodology provides a framework for navigating possible challenges while promoting open discussion, the development of common language, and the use of evidence-based, iterative design as tools for successful collaboration.⁴⁴ This case study, in particular, demonstrates how lesson study results in a greater emphasis on active learning while encouraging student participation in ways that are more connected to ESL student learning needs. Lesson study's ability to grant space for the authors to learn from each other and contribute their subject matter expertise in an open, direct, and respectful manner was particularly important in the success of this case study. An important step in ensuring effective communication is setting expectations early in the process, particularly through community agreements.⁴⁵

Second, lesson study is a methodology that may be particularly well-suited for librarians teaching ESL students. The focus on observing students in the process of learning new concepts helps librarians gain greater insight into the design and delivery of a lesson plan; however, librarians may struggle to fully understand the nuances of ESL student learning needs.⁴⁶ Observing ESL students in this case study helped the authors better understand the teaching techniques that helped students engage as well as those that left students struggling or confused. A lesson study collaboration may also be welcomed by ESL course faculty due to the deep history of collaborations between librarians and ESL course faculty as well as shared similarities between both parties.⁴⁷

Third, it is important to note that lesson study can be a time intensive process because lesson study members must meet multiple times to develop a new lesson plan, observe the lesson plan, analyze observation notes, and revise the lesson plan. The authors found that the early stages of planning took longer than anticipated due to interdisciplinary differences in language and approaches to teaching and learning. That said, a significant benefit of lesson study is the time commitment itself as the time working together helped the authors better understand each other and forge a stronger relationship that extended even after the lesson study was completed. Other barriers may exist for librarians such as aspects of the lesson study process that may be difficult to implement or institutional unfamiliarity with benefits associated with lesson study.⁴⁸ Those facing barriers or uncertainty in starting a lesson study should remember that lesson studies are often modified beyond the original Japanese model, as evidenced in the variety of lesson study designs reported in the library instruction literature, and that lesson study is still relatively new in the Western educational context, especially in higher education.⁴⁹

The focus on observing students in the process of learning new concepts helps librarians gain greater insight into the design and delivery of a lesson plan.



Fourth, this study finds that reflective thematic analysis complements lesson study well and could be further employed to good effect by future lesson study teams. Reflective thematic analysis' treatment of knowledge as "situational" or as a "consequence of an interaction between the researcher and the data" makes it an effective complement in the lesson study framework, as it is difficult to separate the researcher from the data itself.⁵⁰ Reflective thematic analysis removes the need for this separation and, instead, offers a rigorous framework to standardize and analyze qualitative data collected while remaining flexible rather than forcing researchers to work solely toward "filling a gap" in the existing knowledge. Incorporating reflective thematic analysis early in the lesson study process, potentially as a new phase between observing the lesson and the post-lesson discussion, could maximize the utility of reflective thematic analysis, which would provide an additional layer of data analysis for a lesson study team to use as evidence during the revision process.

Finally, the benefits of lesson study are not limited to the lesson that is produced or the relationship formed between librarians and course faculty. Lesson study, at its roots, is a method to help teachers develop their teaching ability. Participating in a lesson study will help librarians learn new approaches to pedagogy, different methods for engaging students, and unique perspectives on information literacy. The knowledge and skills learned in a lesson study can transfer to other teaching contexts and lesson plans. The collective nature of lesson study can also facilitate the development of communities of practice, which, at scale, suggests lesson study's power to transform the entire library instruction landscape, as evidenced in the history of Japan's educational system.⁵¹

Limitations

A number of limitations should be considered in this case study. First, data collected during the lesson study came from a small sample, both in terms of students observed and the size of the lesson study team. Smaller lesson study teams are not uncommon, but it did limit the number of observations as well as viewpoints when analyzing the data. Smaller sample sizes are often inherent to the lesson study methodology, which may limit the generalizability of the findings in this study.

Second, the present study focuses on relationships among lesson study team members but does not study the impact lesson study has on individuals. Understanding how individuals experience lesson study and the extent to which their teaching changes would be beneficial. Future research focusing on the impact lesson study has on an individual's approach to active learning would be of particular note considering the findings from this study and the literature.⁵²

Finally, this article focuses solely on examining the impact of lesson study on collaboration through qualitative data recorded from observation and meeting notes. Incorporating methodologies that focus on collecting quantitative data may provide additional insights on the impact of lesson study. Quantitative data collection may be of particular use in larger scale studies of lesson study or studies examining lesson study team members' pre- and post-experiences.



Conclusion

Lesson study is a methodology that librarians and course faculty can use to maximize their respective expertise and create meaningful learning experiences for students in the context of one-shot library instruction. This case study demonstrates how lesson study encourages student learning through active learning, while simultaneously strengthening the collaboration and partnership among interdisciplinary team members.

The authors found that lesson study promotes a “best of both worlds” among team members by encouraging subject matter expertise cooperation while also empowering calculated risk-taking. Each member is encouraged to bring their expertise to contribute to a shared vision and given the flexibility to make changes and revisions based on observations of student behavior. Balanced conversations centered around observed and desired student behavior in a reflective manner led to an increase in active learning during the library session and an increased understanding of the characteristics of effective teaching between lesson study team members. Additionally, reflective thematic analysis provides insight into the areas of focus that lesson study promotes when developing and iterating a lesson plan. Incorporating reflective thematic analysis within the lesson study process itself could hold even greater benefits for future lesson study teams by adding an additional level of analysis and insight when making revisions.

Lesson study is an ideal mechanism for interdisciplinary teams to collaborate, particularly in the context of one-shot library instruction. However, lesson study requires time, dedication, and trust to be fully beneficial for instructors, librarians, and, ultimately, students.

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Alexander Deeke is an assistant professor and undergraduate teaching and learning librarian in the University Library at the University of Illinois Urbana-Champaign, email: deeke3@illinois.edu, ORCID: 0000-0002-2560-2636.

John Kotnarowski is a senior lecturer and undergraduate academic writing course specialist in the Department of Linguistics at the University of Illinois Urbana-Champaign, email: kotnaro2@illinois.edu.

Kirsten M. Feist is an undergraduate instruction and engagement strategist in the University Library at the University of Illinois Urbana-Champaign, email: kmfeist@illinois.edu.

Jin Pennell is a senior lecturer and ESL curriculum coordinator in the Department of Linguistics at the University of Illinois Urbana-Champaign, email: jinkim7@illinois.edu.



Appendix A

Observation Forms

Fall 2022 Observation Form

Observer name: _____

Lesson Activities	Expected Student Behavior	Observed Student Behavior & Special Notes
Before class starts	<ul style="list-style-type: none"> i. Log into a computer ii. Pull up their completed "Brainstorming Keywords" worksheet iii. Start searching Google on their research topic and to write down what they are noticing on the class handout 	
<p>Pt 1: Introduction to the Library Session (5 minutes)</p> <p>Pt 2: Searching Google (10 minutes)</p> <p>1. Student Feedback on searching Google</p>	<p>Listen to the purpose of the class and expectations for participation</p> <p>Share their experience with searching Google and what makes sources trustworthy with the whole class (expected response: which domains the source come from, reputation of the publishers or the authors)</p>	
2. Sample Google Search	<p>Follow along the teacher's demo search ("clean water solutions in sub-saharan africa") and discover limitations of Google search, such as the fact that sources from variety of domains and a lot of ads appear</p>	
3. Advanced Google Search	<p><i>Note: Observe if students are paying attention and seem interested in this tool. Watch for students' understanding around Boolean.</i></p> <p>Share their experience with advanced Google search with the whole class (expected response: most have little experience)</p> <p>Follow along the teacher's demo search and become interested in the new tools, particularly the domain searching</p>	

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Appendix A., Cont.

Lesson Activities	Expected Student Behavior	Observed Student Behavior & Special Notes
Pt 3: Introduction to Library Resources	Share other types of sources that	
1. Connecting Google to Library Databases	might be good to find but are not showing up on Google (expected response: books, peer-reviewed articles, news papers) <i>Note: Watch what other sources they mention here.</i> Share if they ever ran into any paywall issues and learn that they can get free access through the library databases	
2. Introduction to Library	Watch "Introduction to the Library" video Follow along the teacher's demo of navigating the library homepage as well as the class page	
Pt 4: Search Library Databases (10 minutes)	Navigate to Find Articles Guide	
1. Find Articles Guide & Academic Search Ultimate	Navigate to Academic Search Ultimate to search sample topic	
2. Introduction to Academic Search Ultimate	Conduct progressively refined keyword search on sample topic alongside instructor; making connection to Google Advanced Search	
3. Keyword Searching	Articulate why a keyword such as, "solution," is not effective for keyword searches	
4. Refining results	Refine results with tools on the lefthand side of Academic Search Ultimate Filter results by Academic Journals and the years 2015–2022	
5. Scanning Results	Alongside instructor, scan results by reading titles and using magnifying glass to display abstract Briefly share purpose of abstract Make note of full text availability	



Appendix A., Cont.

Lesson Activities	Expected Student Behavior	Observed Student Behavior & Special Notes
6. Evaluating Sources	<p>Open: "Acceptability and Use of Portable Drinking Water and Hand Washing Stations in Health Care Facilities and Their Impact on Patient Hygiene Practices, Western Kenya"</p> <p>Examine elements of database record</p> <p>Click journal title to determine if it's peer reviewed</p>	
7. Access & Tools	<p>Click pdf full text</p> <p>Explore toolbox features</p> <p>permalink, email, and cite</p>	
<p>Pt 5: Database Searching Activity (15 minutes)</p> <p>1. Overview</p> <p>2. Activity</p>	<p>Turn attention to backside of handout</p> <p><i>Note: Observe if instructions appear clear or confusing to students. Observe if and how Ss use what they learned during the teacher's demo (either from the Advanced Google Search demo or the database search demo).</i></p> <p>Partner with classmate</p> <p>Select one partner's topic</p> <p>Student with topic being used should open webtools form</p> <p>Find one article that meets the following standards: peer-reviewed, no more than 5 years old, useful for their research project</p> <p>Copy and paste title, year, and permalink into form. Note in form what worked, what was challenging, and how challenges were worked through</p> <p>Search other partner's topic as time allows</p>	

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Appendix A., Cont.

Lesson Activities	Expected Student Behavior	Observed Student Behavior & Special Notes
3. Discussion	Share what worked well Share what was challenging and how challenges were worked through <i>Note: Notice how students revise any ineffective keywords they come to class with (in the Brainstorming Keywords worksheet) and what strategies they used for that</i>	
Pt 6: Conclusion (5 minutes)	Write three things learned today	
1. Minute Paper		
2. Getting Help	Make note of help options	

Spring 2023 Observation Form

Note for Observers: Anything underlined means changes made in SP23 lesson plan. Anything in *italics* means things we should pay more attention to (e.g., things we changed or things that were unclear / lacking in our Fall 22 observation)

Observer name:

Lesson Activities	Expected Student Behavior	Observed Student Behavior & Special Notes
Before class starts	i. Log into a computer and open their course website ii. Pull up their completed "Brainstorming Keywords" worksheet and open the Lib Guide iii. Start searching Google on their research topic and to write down what they are noticing on the class handout	
Pt 1: Introduction to the Library Session (5 minutes)	Listen to the purpose of the class and expectations for participation	
Pt 2: Searching Google (10 minutes)	Share their experience with searching Google and what makes sources trustworthy with the whole class (expected response: which domains the source come from, reputation of the publishers or the authors)	
1. Student Feedback on searching Google		



Appendix A., Cont.

Lesson Activities	Expected Student Behavior	Observed Student Behavior & Special Notes
2. Sample Google Search	<p>Follow along the teacher's demo search ("clean water solutions in sub-saharan africa") by typing the key words in the search engine.</p>	<p><i>We allowed more time here - are students actually able to type in the sample keywords themselves better this time?</i></p>
3. Advanced Google Search	<p>Discover limitations of Google search, such as the fact that sources from variety of domains and a lot of ads appear</p>	<p>Share their experience with advanced Google search with the whole class <i>Previously nobody had experience with Advanced Google Search, but is it different this time?</i></p>
	<p>Follow along the teacher's sample search, their demonstration of multiple ways to use keywords in Google and tips on good vs bad keywords by using a sample "Brainstorming Keywords" worksheet and multiple ways of narrowing down the result. <i>What types of questions do students ask about this tool or formatting keywords in general? Do Ss try to pull up their worksheet to try out their own key words at this point?</i></p>	

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Appendix A., Cont.

Lesson Activities	Expected Student Behavior	Observed Student Behavior & Special Notes
Pt 3: Introduction to Library Resources 1. Connecting Google to Library Databases	Share other types of sources that might be good to find but are not showing up on Google (expected response: books, peer-reviewed articles, news papers)	Answer if they should use the library database or Google to find Government website, newspaper articles, Blog, or Scholarly articles. <i>How do students answer this question? What reasons do they give for using one over the other for finding a particular type of source?</i>
2. Introduction to Library	Share if they ever ran into any paywall issues and learn that they can get free access through the library databases Watch "Introduction to the Library" video	Follow along the teacher's demo of navigating the library homepage as well as the class Lib Guide, which is now linked in Moodle. <i>Can students find the Lib Guide more easily this time?</i>
Pt 4: Search Library Databases (10 minutes)	Navigate to Find Articles Guide <i>Some students got lost here before. Can students do this better with the "pause and repeat" we added in our lesson plan?</i>	
1. Find Articles Guide & Academic Search Ultimate	Navigate to Academic Search Ultimate to search sample topic <i>Some students got lost here before. Can students do this better with the "pause and repeat" we added in our lesson plan?</i>	
2. Introduction to Academic Search Ultimate		

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Appendix A., Cont.

Lesson Activities	Expected Student Behavior	Observed Student Behavior & Special Notes
3. Keyword Searching	Conduct progressively refined keyword search on sample topic alongside instructor, double-checking their spelling of the sample keywords (e.g., hygiene)	
	Articulate why keywords such as “solution, prevent, cause” are not effective for keyword searches <i>We added synonyms of “solution” in our instructions this time. Does this make students use those terms less in their own search this type?</i>	
4. Refining results	Refine results with tools on the lefthand side of Academic Search Ultimate	
	Filter results by Academic Journals and the years 2015–2022	
5. Scanning Results	Watch the instructor scan results by reading titles and using magnifying glass to display abstract (instead of looking at their own screen)	
	Briefly share purpose of abstract	
6. Evaluating Sources	Make note of full text availability	
	Open: “Acceptability and Use of Portable Drinking Water and Hand Washing Stations in Health Care Facilities and Their Impact on Patient Hygiene Practices, Western Kenya”	
	Examine elements of database record	
	Click journal title to determine if it’s peer reviewed	
7. Access & Tools	Click pdf full text	
	Explore toolbox features	
	permalink, email, and cite	
Pt 5: Database Searching Activity (15 minutes)	Turn attention to backside of handout	
1. Overview		

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Appendix A., Cont.

Lesson Activities	Expected Student Behavior	Observed Student Behavior & Special Notes
2. Activity	i. Partner with classmate ii. Select one partner's topic iii. Student with topic being used should open webtools form iv. Find one article that meets the following standards: peer-reviewed, no more than 5 years old, useful for their research project v. Copy and paste title, year, and permalink into form. Note how their search went. vi. Search other partner's topic as time allows <i>Notice if and how Ss use what they learned during the teacher's demo (either from the Advanced Google Search demo or the database search demo).</i>	
3. Discussion	<i>How many students (and how often do they) ask for help from the instructor(s) or peers during their search? It would be nice to also note whether peer assistance is still happening throughout the session like last semester.</i> Share what worked well Share what was challenging and how challenges were worked through Share what combination of keywords worked well, and if they found any new keywords while searching. <i>Notice how students revise any ineffective keywords they come to class with (in the Brainstorming Keywords worksheet) and what strategies they used for that. Do some of them also come up with new (combination of) keywords?</i>	

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Appendix A., Cont.

Lesson Activities	Expected Student Behavior	Observed Student Behavior & Special Notes
Pt 6: Conclusion (5 minutes)	Write three things learned today	
1. Minute Paper	<i>Last semester, some students utilized this Minute Paper as a note-taking space during the class. Did it happen again?</i>	
2. Getting Help	Make note of help options	

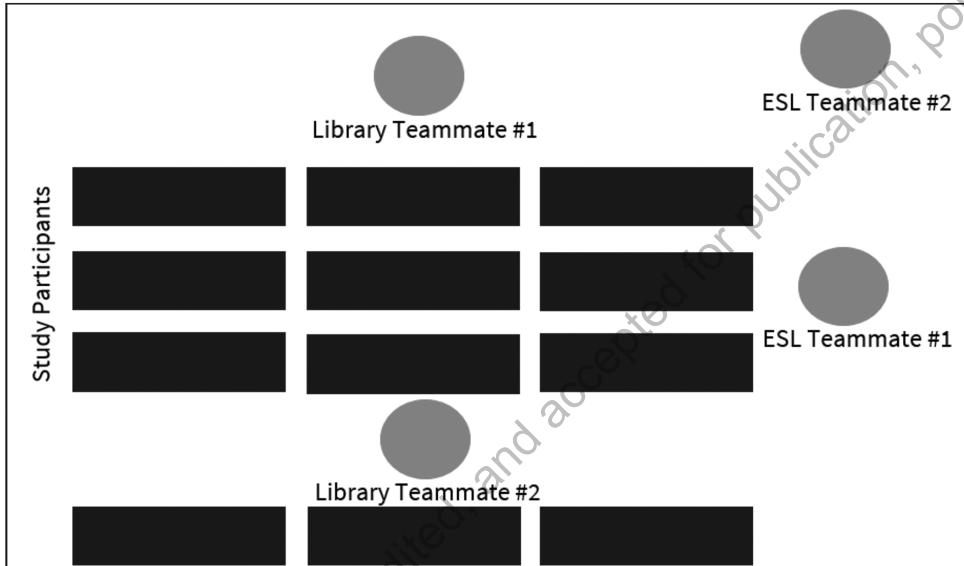
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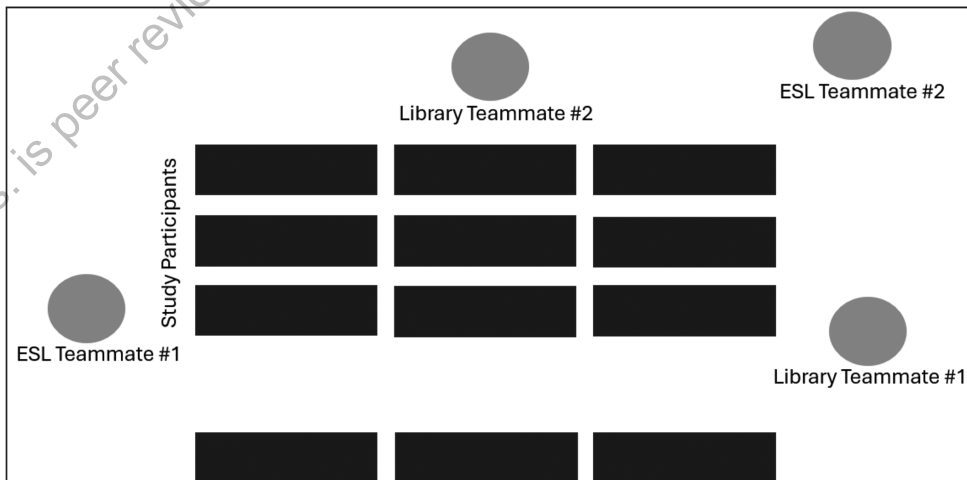
Appendix B

Lesson Study Observation Diagrams

Fall 2022



Spring 2023





Appendix C

Reflexive Thematic Analysis Coding Hierarchy Key

Theme/Sub-theme	Definition
Facilitator Impression	A family of tags related to the (in)directness with which team members shared their ideas and opinions.
Learning Outcomes (LO)	A family of tags related to goals of the lesson.
<i>LO1 Keywords</i>	Tagged content related to brainstorming, modifying, and employing keywords to find sources for student research.
<i>LO2 Search Strategies (Academic Search Ultimate)</i>	Tagged content related to finding sources in Academic Search Ultimate including how to combine keywords, how to decipher source records, and how to use database tools to share sources and generate citations and permalinks.
<i>LO3 Search Strategies (Google Advanced Search)</i>	Tagged content related to finding sources through the use of Google Advanced Search including how to employ keywords and how to use different limiters.
Lesson Planning (LP)	A family of tags related to the planning of the research lesson.
<i>LP1 Building in More Engagement/Interaction</i>	Tagged content related to the promotion of student engagement and employment of active learning strategies.
<i>LP2 Clarity of Instructions</i>	Tagged content related to the clarity of instructional language.
<i>LP3 Defining Terms</i>	Tagged content related to the way key terms are defined as well as clarification of terms and the development of shared language among the team members.
<i>LP4 Sequencing/Timing</i>	Tagged content related to the sequencing/timing of activities in the lesson.
Observed Student Behaviors (OSB)	A family of tags related to observations of student behaviors during the teaching of the research lessons.
<i>OSB1 Collaboration</i>	Tagged content related to the ways in which students worked with one another (or did not).
<i>OSB2 Confusion</i>	Tagged content related to the perception (or direct expression) of student confusion.



Appendix B., Cont.

Theme/Sub-theme	Definition
<i>OSB3 Engagement</i>	Tagged content related to observations of student engagement (or lack thereof) with lesson activities, the instructor, and/or classmates.
<i>OSB4 Familiarity with Concepts and Tools</i>	Tagged content related to perception of (direct expression) of student familiarity with the concepts presented and/or tools (e.g. Google Advanced Search) employed during the research lessons.
<i>OSB5 Surprises</i>	Tagged content related to surprising observations made on the part of the lesson study team members.

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