

MODELS AND DESIGN JUDGMENT: CONFLICTING PERSPECTIVES ON REDESIGNING A DOCTORAL READINGS COURSE

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The purpose of this project was to document the redesign of an existing doctoral reading course for an online environment. Potential methods for actualizing the proposed course structure in an online environment, including technology tools and interactions are discussed. The design process began within the framework of the Four-Component Instructional Design (4C/ID) model (van Merriënboer, 1997; van Merriënboer & Kirchner, 2007), which advocates a shift from topic-centeredness to a task-centered course organization, but quickly evolved into a flexible, iterative design process that was informed by prototyping, the judgment of the design team, and various theories of knowledge and knowing. The 4C/ID model represented our philosophical starting point, but our focus quickly shifted to a more flexible, eclectic process as we attempted to reconcile conflicting constraints on the final design. Along with the redevelopment of course objectives to meet strategic goals within the doctoral program came a focus on facilitating research thinking of the students rather than teaching isolated research tasks. The design process resulted in changes to the current residential course, which then provided an opportunity for further investigation.

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DESIGN CONTEXT

The Instructional Systems Technology (IST) department at Indiana University (IU) had requested (and received) approval for a new online doctor of education (Ed.D.) degree program, and there was a defined need for existing classroom courses to be converted to an online format. The design team identified a number of existing residential courses that would require conversion, and selected a doctoral reading course. The team began the conversion of the reading course in Fall 2010, and the anticipated start date for the online course was Fall 2012. This design case documents the process of this design team to convert the residential course to an online format, including a selection of methods to effectively meet course goals in an online setting. While the redesign began as an effort to convert the residential course to an online modality, the resulting design process also caused the design team to redesign and rethink many aspects of the residential course as well.

The existing residential course intends to familiarize doctoral students with seminal and current readings, and to help students construct frameworks for their continuing development as scholars in the field. As a core doctoral reading course, students enrolled in this course are assumed to have previous lived or academic experience in the field. This reading course covers a variety of topics important to the instructional technology academic community, including: instruction and learning, design and development theory, systems, evaluation, and human performance technology. The residential section of this course has historically been offered in the fall semester, with 10 to 20 students enrolled, including both doctoral students and students minoring in the department.

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In the residential reading course, students meet once a week for three hours to discuss various seminal topics with readings selected by the instructor and the department. Additional course tasks include the critique of selected readings and the completion of a literature review on a topic within the field. The existing course included an established syllabus, set of course goals, and associated list of required readings. The goals of the course stipulated in the Fall 2010 syllabus included:

1. Develop an understanding of key issues and concepts within IST
2. Develop the ability to critically analyze and synthesize IST-related publications from a variety of perspectives; and,
3. Develop a literature review for a topic of interest within IST.

Due to the unique role of a reading course in establishing an overview of an entire body of literature, a variety of readings, drawing from handbooks, seminal books, and journal articles were included in the list. Also, because of the rapid progression of the literature, the reading list had been modified multiple times in the past five to ten years to add more recent readings or reflect new trends in the field.

The design team for this project included four first-year doctoral students (as of Fall 2010), one post-doctoral student, and the chair of the IST department, who served as the key stakeholder for the project. Three members of the design team had significant previous experience in instructional design settings, and the majority of members also had teaching experience. Three members were in the process of taking the residential course when the redevelopment work began, and the remaining doctoral student took the course during the second year of the course redesign effort.

The primary setting of the design process was a weekly group meeting, where progress was discussed and tasks were assigned. During each of these meetings, starting in November 2010, detailed notes were taken in a Google Docs document, allowing a primary note taker to capture the contents of the meeting and any applicable design

decisions, while other group members could log into the same document to add comments or additional notes. This capability allowed for ongoing triangulation of data captured from the primary work sessions on this project. This triangulation was important both to verify important decisions for later reference in the process, as well as document the design process in order to write this case in a trustworthy, transparent manner. The project goals for this research were originally directed towards formative research (Reigeluth & Frick, 1999), which seeks to create, test and improve design models through the design of an artifact. In conjunction with these goals, a design model was identified to structure the design process. The method selected was based on the book *Ten Steps to Complex Learning* (van Merriënboer & Kirschner, 2007), and the associated Four-Component Instructional Design model (4C/ID) (first introduced as a model in van Merriënboer, 1997). The model was selected because it was of mutual interest to several in the group, it addressed complex tasks and performances, and at the time we began the project, no substantive design work had been documented using this model. This model proposes that there are four basic components that can be used to understand and structure complex learning, including: 1) learning tasks, 2) supportive information, 3) procedural information, and 4) part-task practice (van Merriënboer & Kirschner, 2007). These four components align with the *Ten Steps* as non-linear steps that inform the design of each component. This design case addresses elements of the first three components that were used to structure portions of our design process, documenting our use of the 4C/ID model in practice, especially in the initial phases, eventually leading to areas of the process that relied heavily on design judgment (Nelson & Stolterman, 2012) and much less on the framing of the model.

DESIGNING THE COURSE

The general timeline of our design process spanned from Fall 2010 to Fall 2011, moving from an initial conception of the course and data gathering, to identifying authentic tasks to be implemented in the course, to rapid prototyping of potential course structures, to finalization of the core concepts and course structure (Figure 1). Each stage of the

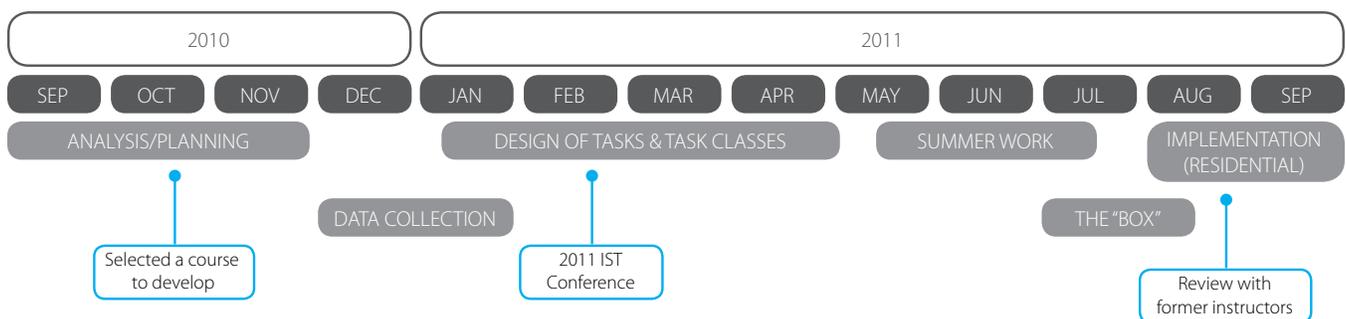


FIGURE 1. Overall timeline of the development process.

design process will be explained further in the following sections. The timeline of the primary development process is represented in Figure 1, with main tasks represented in light gray and events in blue forming the general structure of the text that follows.

Initial Concept and Data Gathering (September-January)

Due to the departmental need for an online version of the existing doctoral reading course, our end goal was defined early in the process. The doctoral reading course was selected among other potential courses because it would be among the first offered in an online format in the new degree program.

The project began as an evaluative process at the request of the stakeholder, including the administration of a custom course evaluation instrument (Frick, Chadha, Watson, & Zlatkovska, 2010) to the Fall 2010 residential course. This evaluation was administered in December 2010, and individuals from the residential course were asked to participate in a short interview to provide information about their experiences in the course. Nine students were interviewed about their experiences in the course, including questions about potential improvements, the effectiveness of teaching strategies, and the role of the course in helping them solve real-world problems. In addition, two former instructors, each with at least three years of experience teaching the course, were interviewed in our group meeting. The faculty answered a set of questions similar to those posed to the students, with additional follow-up questions about the planning of the course and what teaching strategies had worked most effectively in the past. Similar data were collected during the Fall 2011 version of the residential course, which will be discussed later in the design process.

Design of Tasks & Task Classes (January-April)

After deciding to design this specific online doctoral course and parallel to collecting data about the current iteration of the residential course, formal discussion on the development of the new course structure began. The decision to use the 4C/ID model was made due to several factors, including interest by several team members in applying this newer design methodology to a real-world problem, lack of case studies exploring the real world use of this model, and the presence of complex learning elements in the course that was selected for redesign. Additionally, the model requires a course to shift from being topic-centered to a more task-centered organization.

The first step of the model, designing the learning tasks, was the most daunting. Learning tasks, based on the 4C/ID model, were intended to be *authentic whole tasks*. In other words, the tasks should be ones that professionals would execute in the real world (authentic) and indicate a set of

actions that would be representative of a complete task (whole) performed in the real world, not an isolated set of procedures. The group struggled to find a single authentic, whole task that met these criteria. The first approach used was group brainstorming, with an output of recommended whole tasks that could be used in the final course. Several group members presented their concepts, many of which were based on goals for the course referenced in the interviews by previous faculty. Some of these concepts included the importance of academic reading skills (using the seminal book by Adler & van Doren, *How to Read a Book*, 1972), how to talk as an academician, and the sequence of reading research with understanding, critiquing the reading, then presenting the findings to others.

In the design discussion, the team agreed that the student executing the real world task in the course was a researcher or researcher-practitioner applying their knowledge of the field to new problems or literature. This profile represented our target audience for this design, and is consistent with the goals of the doctoral program in which this course is placed. The design team then turned to the competencies that a researcher needed in order to understand and synthesize research literature, including the importance of understanding the types of knowledge claims being made. While consistent discursive structures exist in the text of most research literature—literature reviews, methods, data collection, and analysis—the core of each article includes knowledge claims the author made, either based on previous research or their own research findings. The design team used this problem framing as our overarching “whole task” to evaluate how a student would know whether the claims an individual author made should be believed, and on what basis or criteria they should be believed.

As we explored the problem framing implied by this understanding of knowledge claims, even larger pedagogical and curricular issues emerged. Even as this overarching learning goal of reading and synthesizing research literature was addressed, the design team recognized the challenge and difficulty for students to realistically reach this goal, particularly within one 15-week, three-credit course. In this early assessment, it became clear that the readings course must start the process toward facilitating research thinking, and that it should serve as the start of a trajectory of toward becoming a scholar and researcher. Although we were designing the course representing the beginning point of this trajectory, implications for additional doctoral courses, and the structure of the doctoral program at large were discussed. In short, the design team was addressing learning goals that span semesters and years, not just 15 weeks, and this realization increased the felt complexity of the course we were redesigning.

During the process to find the one whole task that would inform the course design, several weekly meetings were

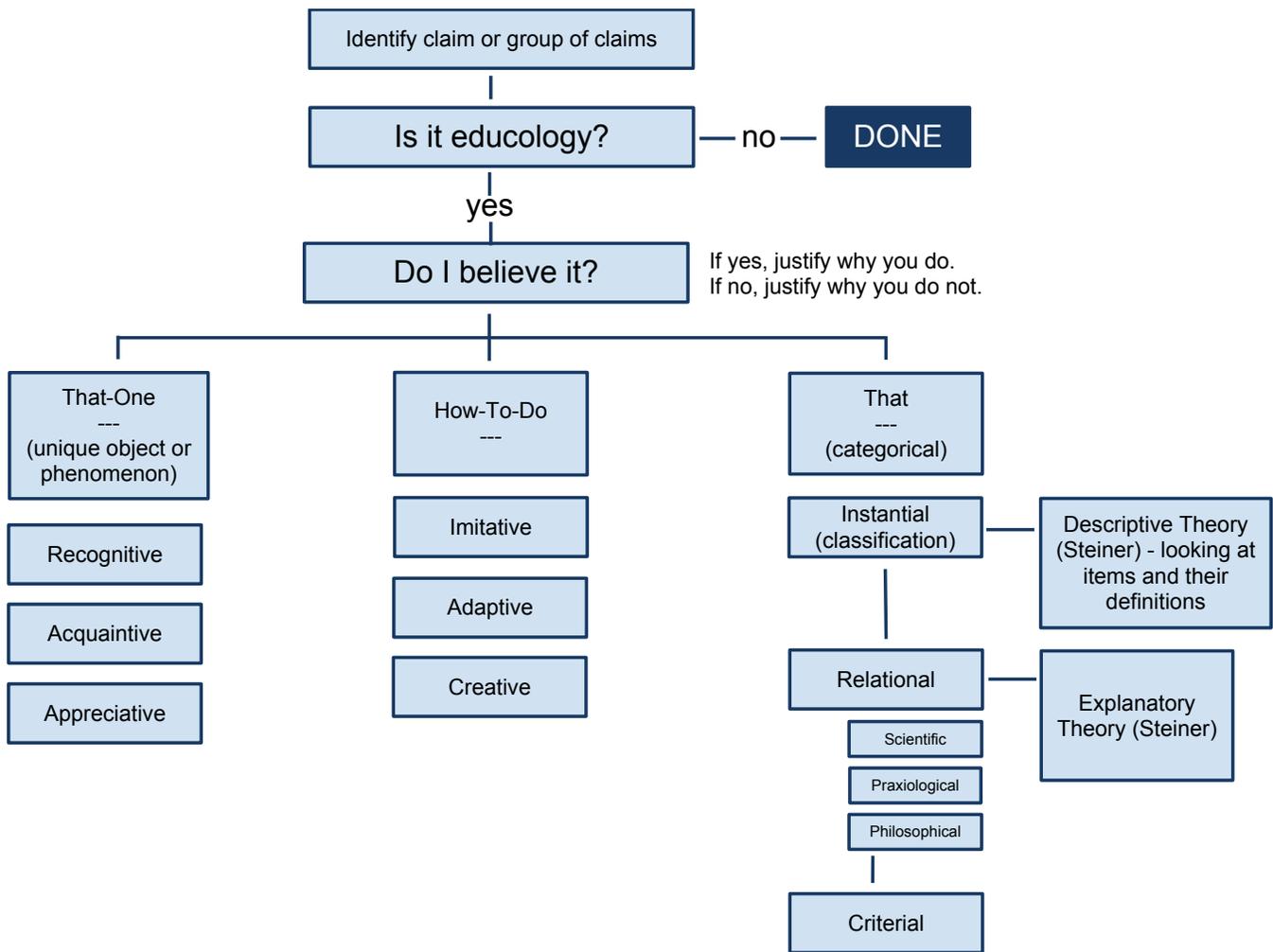


FIGURE 2. Draft flowchart of analyzing a knowledge claim that the team used to work through the discussion of TIE theory (from Google Docs meeting notes).

spent discussing theories of knowing, including the theory of Totally Integrated Education (TIE; see Frick, 2012) and its basis in the work of Peirce (1932), Short (2007), Maccia (1987, 1988), and Steiner (1988). TIE theory includes concepts of worthwhile education, including the integration of different mental structures through different types of knowledge: knowing-that-one, knowing-that, and knowing-how. Although the integration of this theory was helpful with regard to understanding types of knowledge, the design team felt a conflict between TIE and our design process at this point. A hybrid of the two approaches—TIE theory and our existing design process—was attempted, with limited initial success due to unclear transfer between theories of knowing and practical identification of knowledge claims “in-the-wild.” This focus indicated a shift toward the more cognitive aspect of the course, meanwhile neglecting the holistic vantage point we had begun exploring early in the design process, especially in the initial brainstorming process.

To further understand and consolidate the design discussion after the introduction of the theory of TIE, the team developed a flowchart (see Figure 2) of a justification process a student would go through for each identified knowledge claim. This process assumes that the reader would be able to comprehend academic articles in the field. Once the students read the article, they should be able to identify the key claims made by the author, both what they cite from others and what they conclude at the end. Furthermore, with the identified set of claims, the student should be able to validate the claim. First, by asking whether I believe the claim or not, the student is expected to use their lived or vicarious experience in validating or invalidating the claim. If the student believes the claim is trustworthy, they are expected to justify the claim, based on the knowledge claim categories suggested in the TIE theory. This use of TIE theory included the 3-fold presentation of types of knowledge (that-one, how-to-do, and that) and the nine related types of knowledge within each category. The use of educology (or knowledge having to do with education in a broad sense) as

an early framing device for the student was derived from the work of Steiner (1988) and clarified in the context of types of educational knowledge in TIE (Frick, 2012). The remaining structure presented in this flowchart was developed while working through potential *task classes* and *whole tasks* (defined below, and in van Merriënboer & Kirschner, 2007), as specified in the 4C/ID model.

During the Spring 2011 semester, the work-in-progress for this course redesign was presented at an annual departmental academic conference in a roundtable format, and this presentation was used to solicit additional feedback from the attendees. Attendee feedback included a discussion of what whole tasks might be appropriate, and the necessity of understanding which articles were suitable (or not) for beginning researchers, including the basis on which something should be judged as appropriate.

Pilot Testing (March-April)

Once the flowchart was in draft form, the design team conducted a pilot test using a seminal article representing a well-known controversy from the doctoral reading course syllabus. Each team member read the article individually, highlighting each knowledge claim they could locate. In the next team meeting, the team members formed a consensus about which knowledge claims were foregrounded, and came to the conclusion that there were one or two primary claims in most articles, and then a large number of secondary claims that supported the primary claims. The design team then progressed through the flowchart using the identified primary claims, discussing the levels of application to educology, personal belief, and the category of the knowledge claim.

After this pilot testing, the team began to consider the second of ten steps in the 4C/ID model: sequencing task classes. In the 4C/ID model, a *task class* is created for each real world task (or subsidiary *whole task*) and individual iterations of that whole task are sequenced from easy to difficult. The team first separated the flowchart model into four task classes: identifying the knowledge claim, belief of the claim, the category of knowledge claim, and the type of knowledge claim (within the category). At this juncture in the design process, the semester was drawing to a close, and although we had identified a tenable whole task and related task classes, we had only worked through the first or second defined step of the 4C/ID process. Although the focus was on the whole task and task class concepts, inevitably, discussion included other elements of the design process not explicitly referenced in the early stages of the defined design process. These included practical scheduling considerations within the planned semester of coursework, the role of task classes that interacted with each other (or were sequenced against each other), and potential delivery methods for the final instruction. This approach was highly model-centric, and brought the design team into discussion about abstractions of the design, rather

than interacting with the final design (and potential delivery methods) itself.

In each of these cases, the framing of the 4C/ID model gave us little specific direction in terms of application, and the experience and judgment of the design team was seen as essential to supplement these weaknesses or gaps in the model.

Organization and Prototyping (May-August)

The participants in the summer work session for this project included the chair of the department, still serving as a key stakeholder, and two members of the design team. Each of these members had taken the residential course in Fall 2010 and had previous instructional design experience. The first two weeks of the summer served as a planning period, including the creation of goals, a project timeline, and initial work towards the organization of materials within task classes. Similar to the design group meetings during the semester, notes of what tasks were accomplished throughout the summer were taken in Google Docs to establish progress and accountability. Early in the summer design process, the team became acquainted with a text often used in social science research by Booth, Colomb, and Williams (1995) entitled *The Craft of Research*. This text generated additional discussion between the summer design team regarding reading research literature, and in particular, clarifying the role of knowledge claims independently from the team's experience with TIE theory. This text was used as a reference for the remainder of the summer from a pedagogical perspective, and was included as a recommended reading in the overall course structure. In reflection, this text was used as our only direct source of design precedent for teaching research skills outside of previous versions of the course, and provided a helpful counterpoint from a broader social science perspective on these issues.

Timeline and project management. The initial summer timeline included design and development work on the site, with completion of the main design tasks projected for early July 2011. The flowchart shown in Figure 3 represents a project-planning document that was developed to organize tasks that would need to be completed in order to create the final online course. These tasks included the development of task classes around the content of the course as an application of the 4C/ID model, creation of a course web site, and the creation of supportive worksheets and other instructional materials. External to this timeline, a more extensive plan for creating task classes, supportive materials, and just-in-time (JIT) materials was detailed, including the distribution of duties to the members of the design team.

In parallel with the development of the project timeline, existing reading materials for the course were quickly evaluated and mapped against the task classes the group had defined during the spring semester. Because this course

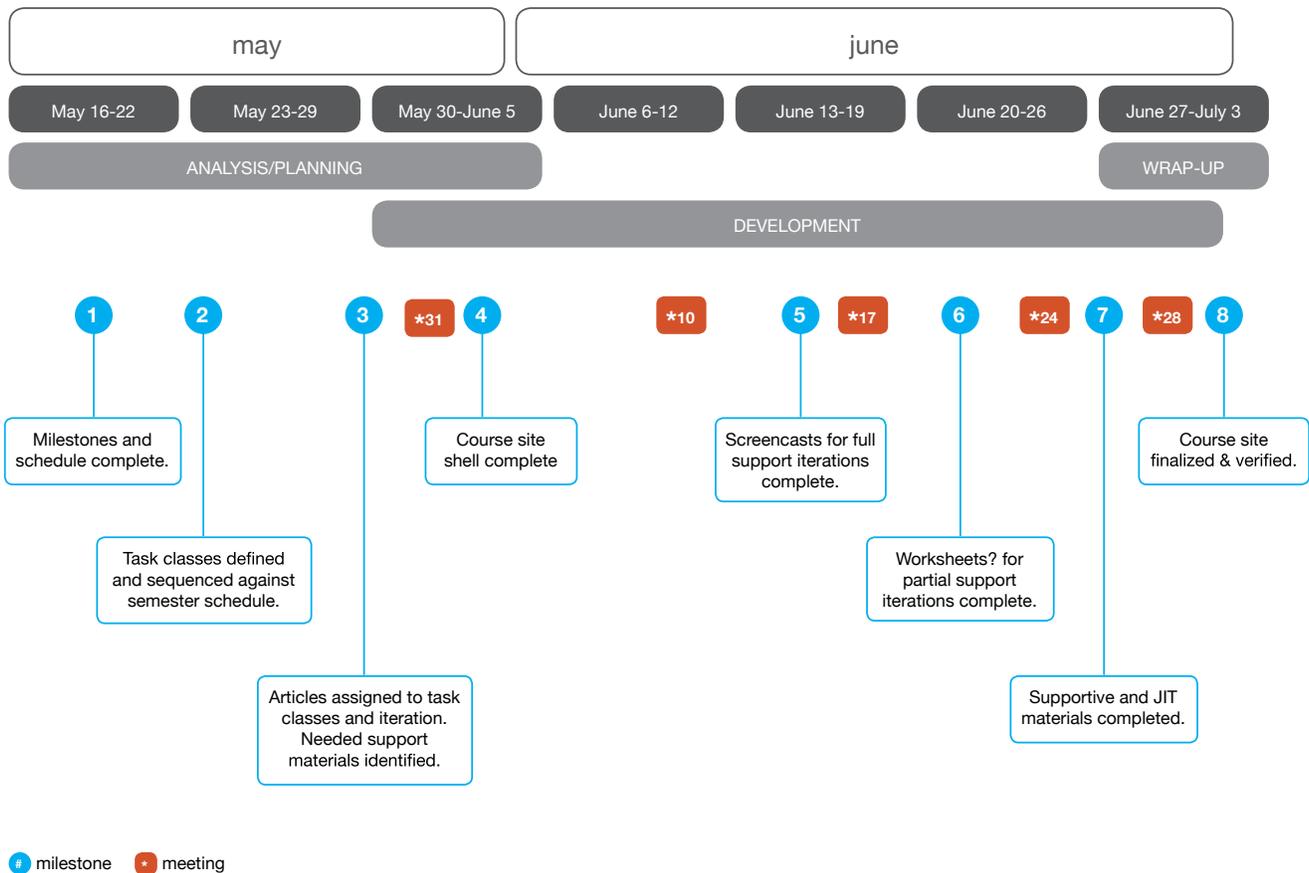


FIGURE 3. Draft Development Timeline for Summer Work

is a foundational course in the doctoral program, all faculty members in the department have historically contributed to the formation of the reading list, and so the existing reading list was treated as relatively static in our design process. Several major design decisions were made during this brief period of rapid prototyping, including: merging related reading themes from the residential course into single blocks of content (Design and Development, Learning and Instruction, etc.) and continuing the theme structure as an organizing concept. The second decision, utilizing themes as an organizing structure in the course, was adopted in order to present continuity of thought throughout the course. A “spiral” structure was discussed, including reading an article from the majority of themes each week, but the lack of congruity between readings, along with minimal opportunities to critique opposing viewpoints offered by reading multiple perspectives within a single theme, outweighed the potential for cross-theme evaluation and exploration.

Rapid prototyping of task classes. The organization of the existing reading list and themes against the task class structure took place over a two-week period at the beginning of the summer, with two designers following a rapid prototyping method (Tripp & Bichelmeyer, 1990).

This method emphasizes quick exploration of multiple “what if” scenarios and supports user feedback without the need for full development, allowing a wide range of design possibilities to be explored without an overwhelming time commitment. Conflicts were found as the designers had to combine the topical sequencing of the existing curricula and the simple-to-difficult sequencing suggested by the 4C/ID model. Acknowledging that the course instructors would prefer topical grouping of the reading materials and recognizing the complexity of identifying the difficulty of the reading materials, the designers negotiated through sorting out the sequence of reading tasks, converging and making compromises based on the contextual needs and constraints. For example, since the explication of “how to” claims (located in the final task class, categorization of knowledge claims) was only present in a direct sense in the design and development literature, those themes were moved toward the last task class, with easier readings or readings with more direct knowledge claims placed closer to the first task class. In association with the reorganizing of the materials against task classes, readings were identified as being directly associated with the task class (following the strategy flow-chart of knowledge claims, belief, and categorization) or as

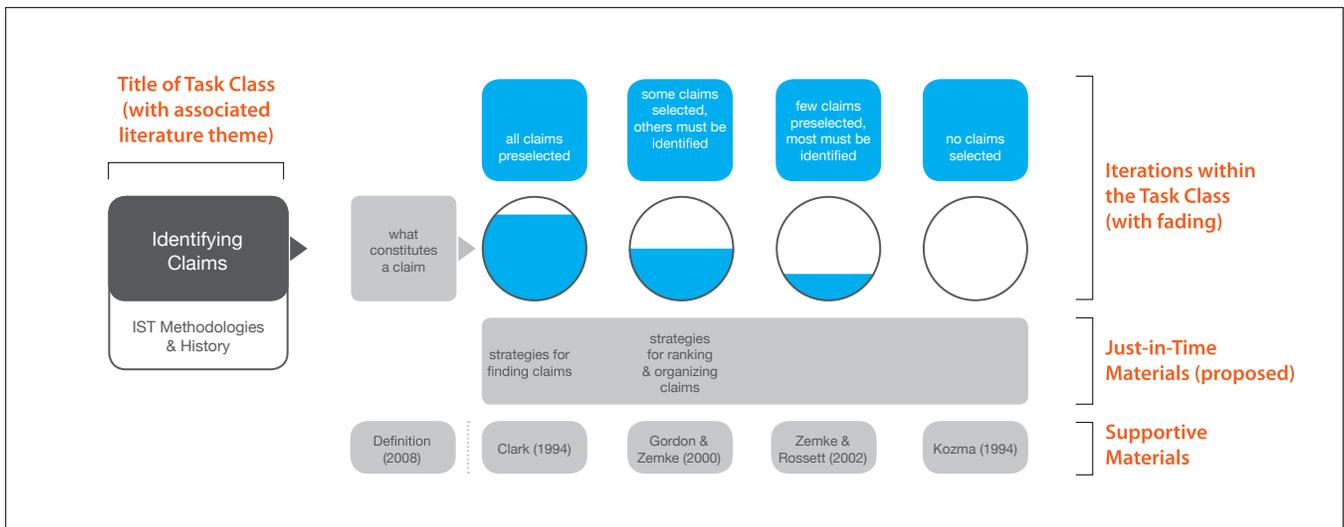


FIGURE 4. The first task class, representing one theme of readings, using a modified version of the diagram used by van Merriënboer & Kirschner (2007).

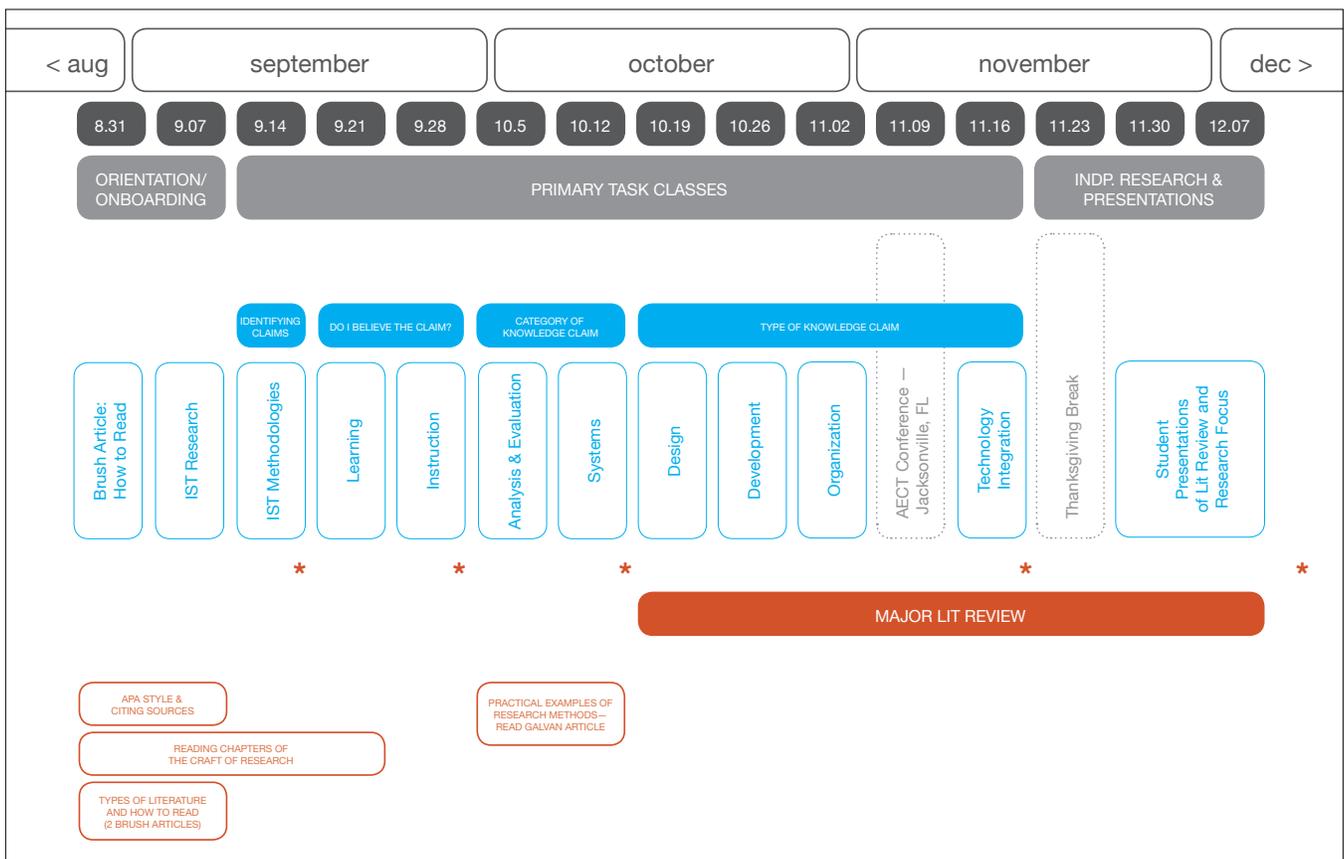


FIGURE 5. Provisional semester course schedule.

supportive or just-in-time information, based on the content of each reading (see Figure 4 for a sample task class).

Some readings were recommended for removal due to age or the emergence of newer trends in the field, or lack of application of the reading to the strengths of the task class

structure. Similarly, some readings had been revised in newer editions, and these more recent versions of the content may offer additional currency to the course.

After several iterations between the two primary designers, a proposed set of task classes was presented to the

stakeholder, and was provisionally approved. In this updated set, some readings were categorized as optional or supportive information rather than as required reading that contributed directly to the faded task class, in keeping with the goal of the task class in developing the student-researcher's ability to identify and evaluate knowledge claims. Supportive information was seen as a flexible concept, since students in the course come from a variety of educational backgrounds, and may have a wide range of previous knowledge in various fields discussed in this course. Therefore, while some students may need more foundational readings on basic concepts, other students may already have a firm grasp of these concepts and find some supportive readings less helpful.

In addition to the design timeline and task classes, a proposed weekly schedule for the course was also created, including an attempt to map each theme and its underlying task class onto a specific week (see Figure 5). The readings and primary deliverables for the course were treated as design constraints, as the objectives for the new online course were required to map to the existing residential course and course description. Therefore, the required reading list and literature review as primary tasks and deliverables for the course were imported from the existing course structure, and the design process focused on reimagining the specific deliverables around the defined task classes. In particular, structure was placed around the readings, where little to no organization beyond clumping into themes had previously existed. Themes were utilized in the preliminary organization of content (Figure 5), but not within the larger task class framing of knowledge claims. Major milestones for critique submissions or literature reviews were also defined, as well as special topic discussions at the beginning of the semester and student presentations of their literature review findings at the end of the semester. The literature review deliverables and presentations were scheduled based on feedback from student interviews. These changes were seen as a way to strengthen the ability of students to develop a specific research interest, present their literature review for formative feedback, and encourage academic discourse.

Supportive and just-in-time information.

After identifying a structure for the contents of the course against the predefined task classes, additional investigation into the types of supportive and JIT information was needed. While this represented a natural next step according to the 4C/ID model, it also

represented a practical step toward completing a section of the course in order to conduct a more thorough evaluation. One of the first design decisions within this task goal was to provide student and professor support by identifying knowledge claims in all articles used or referenced in the course. Practically, supportive materials could be built on top of knowledge claims throughout the course, since the first task class began with the goal of identifying knowledge claims, and all subsidiary task classes relied on a knowledge claim to begin the analysis process. The stakeholder decided that identifying these baseline knowledge claims was critical to understanding what type of supportive information (or sequence of fading supportive information) would be most helpful. The two summer designers split the readings based on their respective research interests and areas of expertise, with one designer addressing Learning and Instruction, Technology Integration, Systems, and Analysis & Evaluation and the other designer addressing the Design & Development,

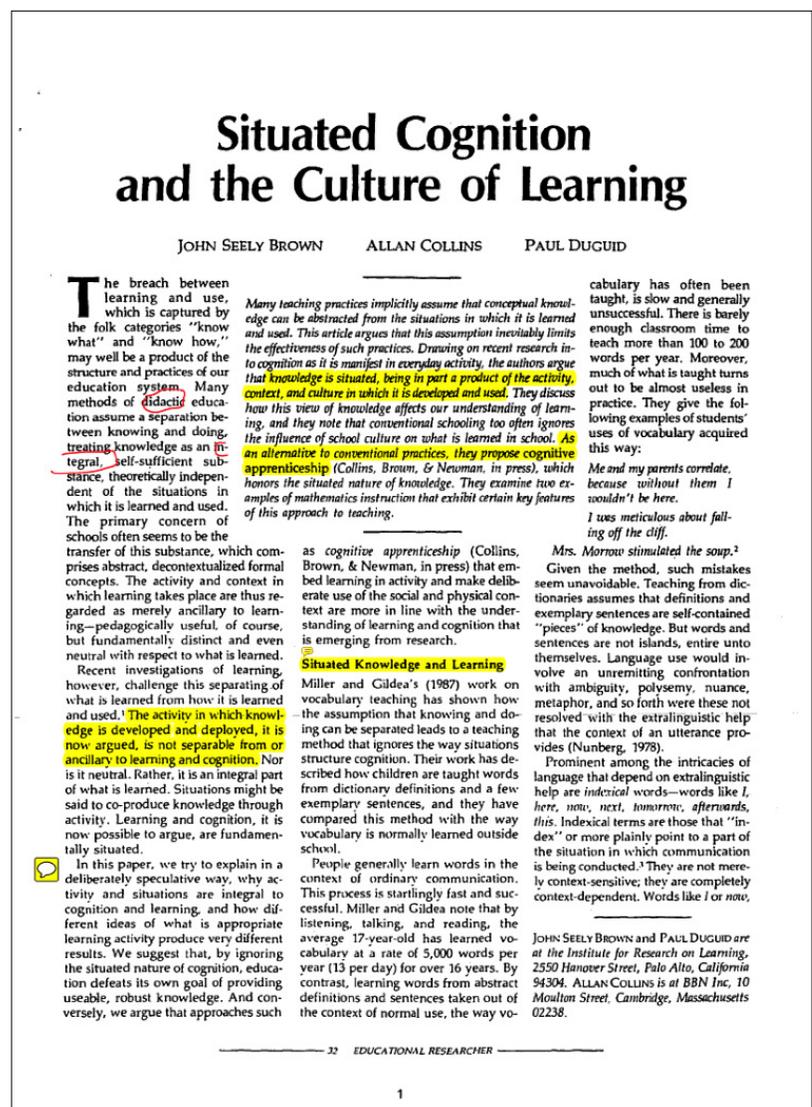


FIGURE 6. A sample highlighted page from one of the course readings. Used with permission.

IST Methodologies (or methods that are frequently used in this academic department), and Organization themes. Each designer worked on the project materials using a shared Dropbox folder, allowing constant communication as to which articles had been completed and to provide version history of the documentation effort. Each article was annotated using Adobe Acrobat, with a combination of highlighting and comments to identify knowledge claims (sample annotated article in Figure 6). During this identification of claims, it became clear that triangulation for this process was needed, as each designer tended to identify claims that were most interesting to them personally, or the claims that were most articulated by the article (as opposed to claims from cited materials). To address this issue, the stakeholder agreed that the designers should review each other's claims after each reading had been completed.

Roadblock (Late May)

During the identification of claims process in the first few weeks of the summer, one of the primary designers was diagnosed with a severe illness, and was unable to assist for the remainder of the summer. Since the triangulation process had just begun, and several process issues were unresolved, the project reached an impasse. After this roadblock, the process moved more slowly, and resulted in a change of strategy to make the best use of available time.

The "Box" (July-August)

Close to the middle of the summer, an incoming doctoral student with little background knowledge of IST-related literature became aware of this project and volunteered to review the articles and related annotations, then complete part of the flowchart with each article as a point of triangulation. The original emphasis on a digital workflow (with planned efficiencies in creating final supportive materials) was reduced at this stage. Eye fatigue and lack of readability of some of the materials on a digital screen took their toll on one of the designers, and the decision was made to transition to paper copies of each article. Articles (39 readings in all) were housed in a cardboard box using tabs to represent each theme or task and a hanging folder for each reading within the task (Figure 7). This box was passed to the student volunteer, who continued the article reviews using the paper copies. The designers found the box to be a helpful physical gauge of what articles had been completed, and what articles still remained to be annotated.

The student volunteer read each article, agreeing or disagreeing with the annotated knowledge claims, then proceeding to the next step in the knowledge claim flowchart, stating belief in the claim (or lack of belief) and offering supportive evidence in the form of personal experience. This student volunteer admitted that this process was difficult in many cases, especially when attempting to respond to each subsidiary knowledge claim identified in the article.



FIGURE 7. The box used to contain readings with annotations and student review comments.

The volunteer used a strategy similar to that identified by the designers early in the spring semester, clustering sub-claims under one or more main claims. The volunteer found it much easier to work through the materials in this manner, identifying the "main claim" from a cluster of supporting sub-claims, then analyzing that main claim through the lens of belief.

Near the end of the summer, two faculty members met with the key stakeholder, the department chair, to discuss the progress of the course redesign, which had been delayed due to scheduling conflicts and the unanticipated slower pace of the design team. The stakeholder presented the task classes as the core of the updated course, but the new structure was not readily apparent—it was too complex to be easily understood, especially the design team's path to identifying the "whole task." In addition to this complexity, it was unclear what the instructor's role would be in the online or residential setting, based on the new structure. In other words, how would the instructor teach the class, and how would it parallel or deviate from the existing course structure? This was a design failure. The team did not solicit and receive feedback early enough in the design process from former and new professors teaching the course, which should have been done once the structural elements of the course were identified. The results of the meeting, in addition to later conversations discussed in the next section, revealed the narrow focus of the redesign efforts at this stage, especially in regard to implementation in the classroom and online environment.

Residential Implementation (September-December)

The Fall 2011 semester began with a renewed sense of urgency for the completion of this course redesign. In August 2011, the department received final approval for the online Ed.D. program and applications for the Fall 2012 semester began arriving and this new reading course was slated to be offered during their first semester. Changes

within the residential course were also in progress, with a different professor teaching the course during the Fall 2011 semester. Although this professor was experienced, having taught a wide range of courses in the past, she had never taught this reading course. However, she had been a part of the meetings with the key stakeholder during the summer design process, and sought to integrate some of the suggested changes when planning the course syllabus in late August 2011.

Changes in implementation. During a design discussion with the new residential instructor, the standard reading list (as used in previous versions of the course) was adopted, with any changes to be addressed on a week-by-week basis. Although some of the updated readings may have been helpful because they were more recent, it was decided to stabilize the course along this dimension and focus more actively on the application of these readings within the context of the in-class critique and discussion.

In previous versions of the course, students were required to write a critique on one article each week. While this critique was helpful, a more targeted approach, requiring the student to interact with individual knowledge claims, was found to align more closely with the task classes that were identified in the design process. Therefore, a new article critique template was developed (Figure 8), in which the student had to identify primary claims from one article each week, then support those claims using sources from the article's references, providing a secondary source that the student had identified independently. In addition to this critique document, each student was required to present an

assigned article to the class (using their critique as a basis of discussion) once during the semester. The concept of fading and task classes as identified in our summer design process was largely discarded, with the repetition of tasks seen as too cumbersome and time consuming. In addition, the locking of themes into specific task classes, and thus specific weeks of the semester, made scheduling external presenters unnecessarily difficult. For student critiques, the ability to focus on single articles allowed time resources to be spent in a more targeted way.

While the concept of fading as a structure for sequencing the readings was discarded in the design process, it was used in a more powerful way in sequencing the larger deliverables for the course. The previous residential course required weekly critiques, a minor literature review (approximately 5 pages) at the midpoint of the semester, and a major literature review (approximately 15 pages) at the end of the course. These deliverables had been disconnected in the past, and required independent research to complete each task. In this planning session for the Fall 2011 semester, however, these deliverables were realigned to establish one chain of tasks with decreasing support and increasing complexity. The critique has already been discussed, with the goal of identifying and supporting knowledge claims both through existing article references and the location of an independent source. This idea was expanded for the minor literature review, which was replaced by an annotated bibliography. Each entry in the annotated bibliography could pull information directly from a critique, with each critique introducing a new source to be analyzed. The topic for the major literature review would be decided jointly

ARTICLE NAME	
Article Reference in APA	
Knowledge Claims	<ul style="list-style-type: none"> Knowledge claims made by the author in the reading
Support	<ul style="list-style-type: none"> Support for the claims you listed
RELATED READINGS	
Reference One	<ul style="list-style-type: none"> How this reading is related to the main reading
Reference Two	<ul style="list-style-type: none"> How this reading is related to the main reading

FIGURE 8. Article critique template used in Fall 2011 semester.

by the student and professor earlier in the semester, so that the annotated bibliography could serve as a planning mechanism for the major literature review due at the end of the semester. This sequence of tasks allowed an integration of classroom critique and primary deliverables in a new way, based on the concept of knowledge claims.

Observations of the course. During the Fall 2011 semester, a member of the design team observed the new residential course to see how the new design was being implemented in a face-to-face context. This same design team member was taking a reading course in another department that served similar goals as the IST doctoral reading course, thus providing additional perspective on the standard areas of focus for these reading courses. The observation of the IST course highlighted some primary pathways used by students working through the knowledge claim and support process, including the following strategy: find a claim, locate support (either internal to the text or through an article reference), and judge the claim based on the support provided. This pattern of finding knowledge claims and supporting them (with the required support needed seen as a function of the believability of that claim) was seen as the basic critique activity carried out both in the classroom environment, and as a primary generator for in-class discussion. This same pattern was also emphasized in the individual critique documents, which also served as a generator for class discussion.

The external readings course was viewed as a source of inspiration and precedent, in that it focused on the importance of knowledge claims and the related epistemology and ontology that the claims sprang from. In this way, this course mirrored many of the goals identified in our design process, albeit in different terms, and served as a validation that our design process was directionally appropriate.

Course Experiences

In January 2012, the design team interviewed 14 students from the Fall 2011 residential course. In addition, two design team members interviewed the professor of the course. Overall, students seemed to appreciate the structure and rigor of completing the updated article critiques. The professor noted strategies she used to progressively raise student skill in identifying knowledge claims and evaluating their veracity and support over the course of the semester, including: a gradual implementation of detail in knowledge claim evaluation, the use of in-class and written mentoring and demonstration, and the use of individual and group feedback to identify common mistakes. As a holistic assessment, the professor noted: "I think everyone left the class understanding that there's a great deal more complexity in reading the literature than they thought there was." The addition of the staged literature review was met with mixed success. Some students reported that they utilized the annotated bibliography in the middle of the semester as a helpful

stepping stone to work on their final literature review, while others were unsure where to begin, indecisive about what topic to pursue, or waited until too far into the semester to start the process. The professor noted that the final literature reviews were of varying quality, but all had moved past simple restating of article content to some form of synthesis. She adds that even "lower down on the scale of mastery, people were addressing—trying to address—something bigger than just the list of papers." Prepping for Online

Early in the design process, the design team discussed aspects of online education that could work in supporting the course under consideration. The discussion included common course elements such as discussion forums, chat, and wikis, as well as more collaborative tools like Google Docs, screencasts, and computer-adaptive supportive materials.

One of the most important activities identified by the design team as vital for inclusion in the online course was the process of critique. While the face-to-face version of critique is more easily accomplished due to physical collocation of learners, establishing online dialogue, particularly when students cross multiple time zones with a variety of technology capabilities, can be quite difficult (Newby, Ertmer, & Kenney, 2010). For this foundational concept of critique, various methods have been discussed, including fading of support and increasing difficulty. One possibility might include a webcast/screencast by a professor that includes a demonstration of the critique process using a required article. Then, students might work in small groups or individually to write a critique and present it using a YouTube or Adobe Connect video presentation, mirroring the presentation component of the residential course. This demonstration component not only strengthens the critique competencies of the individual presenter, but also reinforces good critique behavior for the rest of the students in the course. In addition, tools such as YouTube annotations (Howard & Myers, 2010) could be used to allow students in the course to interact with the video presentation in an asynchronous way, asking questions or locating issues that could be further discussed in a Google Doc or forum thread.

The additional deliverables for the course, including the weekly critiques, annotated bibliography, and major literature review, could easily be accomplished in the online setting, using support for individual article critiques (as discussed above) to inform these larger deliverables (see Snyder, Dringus, & Terrell, this issue, for more discussion of communities for online doctoral students). It may also be possible to establish lines of communication with residential students (assuming online and residential courses were offered in the same semester), which could create a larger student community for sharing of knowledge claims and article annotations, as well as additional opportunities for discussion and support.

FINAL DESIGN

This design case represents the process of developing the course *structure* over the period of approximately one year, and does not directly document the design decisions needed to *implement* the final course, beyond the initial pilot testing of concepts in the residential course in Fall 2011. The design decisions that must be made to implement the online course were discussed at length, and include: how students and faculty will interact in an online setting, what materials and methods will be used to facilitate this interaction, and how the final interaction experience might mirror or diverge from the defined residential course experience.

This design process has served to finalize a course framework, in terms of identifying the authentic tasks that are most important to facilitate research thinking, and also in developing activities and environments to support these goals, in both residential and online contexts. While this design process took much longer than had originally been anticipated, one of the biggest challenges was to identify and sequence whole tasks for this particular readings course—and by extension, the doctoral program at large. In this design case, the use of the 4C/ID model revealed concerns about the existing residential readings course, which then informed our thinking about how these goals would transition into the online space. The advantages of using this specific model to design the final course diminished as the project evolved over time, providing insights into potential design directions to pursue, but leaving the decision of how to proceed to the judgment of the design team. In particular, the design team developed their own heuristics and utilized their professional judgment for evaluating progress and success. While the 4C/ID model provided helpful reference points such as task classes and the need for supportive materials, the specific framing of these elements within our design was highly situated, both in the context of a higher education course, and in the use of this model to develop “soft skills” of research methodology.

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