Cases to Courses: Mentored Case-Based Training Courses

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Abstract: This paper describes a methodology for the design of case-based, learning-by-doing training courses. The methodology was based on a course in business reengineering in which teams of trainees of varying levels of experience engaged in authentic practice in the context of a simulated business engagement.

1. Introduction

To meet the rising demands of competitive markets, businesses need to be flexible enough to adjust quickly to changing internal conditions, and changing conditions in their industries. They need workers who are able to think on several levels and in a number of different directions at once (Hammer, Champy, 1993), (Johansson, McHugh, Pendlebury, 1993). Today's training courses do not meet this need. Many current training courses are comprised of classroom training, with lectures as the main source of information. Knowledge gained from this type of training is rigid, inaccessible, and not easily transferable to the workplace. A better model of training is knowledge gained by working on authentic cases based on legitimate experiences in the relevant industry. This facilitates learning of knowledge and skills that transfer to flexible practice (Williams, 1992).

The Institute for the Learning Sciences is presently designing training courses that use mentors to give guidance as learners participate in live simulations of authentic cases. These courses are modeled after company and industry practice, and therefore, lessons and skills learned from the course are directly applicable to working situations. By providing a complex, authentic learning-by-doing environment, in which coaches help build and refine communication and team dynamics skills, and industry experts mentor participants, our courses facilitate the development of case-based reasoning, domain knowledge, analytical skills, and communication skills.

In this paper, we discuss a design method for training courses. It is based on a course in business process reengineering we designed and implemented for a mid-sized consulting firm. We begin by describing the learning goals and course structure. Next, we discuss theories of learning that underlie the design of the course. We then elaborate the methodology used to design and build this course. Finally, we discuss successes and lessons learned from the course, and propose some recommendations for the design of future GBS training courses.

2. Specific Learning Objectives

The first step in designing the training course was to analyze the real training needs of our target audience: business consultants. We interviewed experienced consultants from the firm to determine what skills and industry knowledge their consultants needed to know. The learning objectives thus elicited fell into four categories: domain knowledge, technical skills, communication skills, and analytical skills.

2.1. Domain Knowledge

One of the primary objectives of the course was to teach basic industry knowledge and practices to the trainees. For example, business consultants are called upon to diagnose problems and propose solutions that make their clients more competitive in the marketplace. Therefore, the business process reengineering course provides for the explanation and practice of diagnostic procedures such as interviewing, business process mapping and hypothesis testing.

Client personnel at all levels of expertise need exposure to and reinforcement of the client company's culture. A unique example of the client's approach to business consulting is the client team structure. The team structure reflects the client's philosophy that fosters a collaborative approach to "service delivery," the diagnosis organizational problems and recommendation of solutions. We designed this course to address the host firm's corporate culture by reinforcing practice doctrines for consultants at all levels of experience.

2.2. Technical Skills

We incorporated skills that are central to data gathering, communication and evaluation into the design of the program. The simulation required trainees to practice interviewing, writing, presentation, and quantitative analyses.

2.3. Communication Skills

Communication skills were incorporated into the course through activities such as client interviews, team meetings, and client presentations.

In order to enhance training in demeanor, or how one comes across to an audience, we also included activities designed to teach critical listening skills (Glasman, Koff, Spiers, 1984).
Critical listening allows a consultant to draw reasonable conclusions from information found in various sources. During the course, trainees were assigned to interview business people playing roles as workers at a simulated business. These "workers" use interview scripts that incorporated prompts for critical listening. For example, when consultants interview Verisel workers about inefficiencies in the workplace, the information that they receive is not only given from and limited to the worker's perspective but is often symptomatic of the root causes of inefficiencies. In order to get to these root causes, the consultant must be able to recognize important topics to pursue within and across interviews. Opportunities to develop critical listening skills were provided for all levels of consultants: novice consultants can build successful team relationships and more experienced consultants can learn how to mentor the less experienced.

2.4. Analytical Thinking

Successful consultants are deeply dependent on critical thinking skills. In the design of our course, trainees can develop and use these skills during the practice and feedback offered throughout the conduct. For example, consultants developed problem-solving skills by interpreting the data collected from interviews, surveys, competitive analyses and other forms of research to accurately diagnose problems within Verisel.

3. Business Process Reengineering Course

The course was designed for a mid-sized business consulting firm. It was structured around the case of a fictional client company called "Verisel," which was created out of data from an actual client of the host firm. Host firm trainees worked together in two teams of seven consultants of varying levels of experience. Each team worked with "Verisel staff," played by course designers and personnel from the host firm, with coaches providing guidance and feedback, and with course operators who worked behind the scenes, monitoring activities and making sure the authentic simulation ran smoothly.

Prior to the course, trainees received a preparation packet modeled on packets that working consultants typically receive before approaching a new client. The simulation began on a Sunday evening, when trainees met with an "engagement team," a small group of senior staff from the host firm in role as the authors of the introductory packet. This meeting provided an introduction to the simulation, and an opportunity for trainees to clarify basic questions before serious work began on Monday.

On Monday morning, each team met with a fictional CEO of Verisel, played by a real-life professional CEO from an industry related to Verisel's. As in a typical consulting engagement, the agenda for this meeting was to go over the introductory packet and clarify goals for the week. After the first meeting, the teams were formed. Each group of consultants joined with two high-level Verisel officers, also played by business professionals, to form a consultant-client team. A pattern was established in which each team met during the first part of the day while the rest of the day was spent preparing presentations.

During the course, one or two trainees would often be dispatched by their teams to perform interviews with various members of Verisel's staff. Other trainees maintained email correspondence with "on-line" clients, run by course operation staff who were themselves experienced consultants from the host firm, working from a database of pre-written responses to expected questions as well as their own extensive experience. Coaches met with each trainee two or three times during the course to assess the development of communication skills and team dynamics. On occasion, Verisel staff paid unexpected visits to team rooms to inquire about progress.

On Wednesday, each team gave a mid-week report to the CEO. This was their "baptism by fire," as the CEOs were extremely difficult to please. Trainees prepared their final presentations on Thursday.

Friday morning began with a large group meeting. The Verisel CEO, course designers, members of the consulting firm's executive committee, and both teams of participants attended. Each team presented their findings and recommendations before the entire group. The CEOs and the executive committee gave feedback, and the course ended with a debriefing session on the training itself.

4. Learning Theories Behind Designing and Building the Course

Before designing the course, we defined a means for teaching the learning objectives identified with the clients. Theories of cognition such as case-based reasoning, and of instruction, such as Goal-Based Scenarios (Riesbeck, Schank, 1989), Cognitive Apprenticeship (Brown, Collins, Newman, 1989), and metacognitively aware instruction (Bruer, 1994) inspired the design of our contextualized learning environment.

4.1. Case-Based Reasoning

Case-based reasoning provided the cognitive foundation for the course design. "Case-based reasoning is the essence of how human reasoning works. People reason...[by using] their own experiences if they have a relevant one or they make use of the experiences of others..." (Riesbeck, Schank, 1989).

Reasoning is dependent upon retrieving prior cases, understanding what principles they teach, and adapting this to new situations. This principle was applied to the course design in several ways. For example, one of the functions performed by expert consultants as they mentored their junior team members was telling stories about experiences they had in *similar* situations or in dealing with *similar* issues. We also built a database that contained videotaped stories relevant to issues that the trainees were likely to encounter through the course. These stories, told by other consultants from the host firm, contained information about their actual experiences in dealing with the issues. In addition to reasoning from prior cases, trainees had opportunities to use their own experiences in new situations. Lessons learned through client meetings were applied to subsequent meetings. And through our course they gained experience in participating in a real business engagement. Subsequently, they drew upon domain knowledge and analytical thinking skills learned from the course in order to diagnose and resolve efficacy issues for their real-life clients in the field.

4.2. Goal-Based Scenario

Goal-based scenarios (GBS) are learning environments that present students with well-defined, learning-by-doing tasks which encourage learning in service of achieving a set of goals (Schank, 1991). A GBS provides an authentic context for the pursuit of a meaningful and motivating problem-solving goal.

The design of a GBS is based on five fundamental principles:
1) People learn best by doing.
2) Instruction must be grounded in realistic cases to provide authenticity.
3) The learning environment must be a simulation, so that students can take risks and fail "safely."
4) Real learning occurs as the result of failure.
5) When fundamental misconceptions are revealed by expectation failure, they are remediated by the just-in-time presentation of expert "war stories" that convey an expert's experiential knowledge.

In our course, the goal of the consultants was to convince Verisel to hire the host consulting firm. To achieve the goal, the student must master appropriate skills and learn the required knowledge to make an accurate

diagnosis of problems and propose beneficial solutions to Verisel. Through authentic activities such as interviewing clients, analyzing data, making diagnoses, preparing for and giving presentations, trainees will learn how to successfully execute these tasks in real engagements.

4.3. Cognitive Apprenticeship

Cognitive apprenticeship (Collins, Brown, Newman, 1989) suggests that students be given many opportunities to observe expert problem-solving. Further, the students should have access to any necessary levels of help, or scaffolding, in performing their tasks in the early stages. In our model, consultants of varying levels of domain expertise and experience are placed together in small groups. At first, senior team members model tasks for their more junior counterparts. As the course progressed, the trainees shifted from observing, to enacting and practicing the tasks and mentors shifted from modeling tasks to coaching trainees as they performed the tasks.

Scaffolding opportunities were also incorporated into the design of the course. For example, as we developed a narrative, issues and learning goals on which to base the course, we essentially filtered out any elements that would guide the trainees away from the "right path" towards a viable diagnosis of efficacy issues. We also used communications and presentation coaches to advise trainees. The guidance of the coaches was heavier during the first half of the conduct. For example, on the first day of the conduct, the communications coach would pull out a team member to request a one-to-one briefing of the status of the engagement. The coach would initiate guidance and advice at this stage. The coach's guidance would then "fade" as he began to provide performance feedback to trainees only when needed.

4.4. Metacognitively Aware Instruction

"Metacognitively aware instruction" encourages self-reflection on the part of the student (Bruer, 1994). The purpose of this method of instruction is to help students become critical of their own problem solving techniques. We employed an experienced corporate psychologist and corporate communications trainer as mentors, or "coaches", to scaffold the consultants through this process. We encouraged coaches to use videos of the trainees' work as an analysis tool in one-on-one feedback sessions with the trainees. This process allowed students to view themselves in a more objective manner, and to practice reflecting critically about their own skills.

5. GBS Training Course Methodology

The process that we used to design the course contained six steps. The first step is to define learning goals to be taught in the course. Second, we search for a prototypical case in the world requiring some of these learning goals. We analyze the case for issues in which the learning goals are embedded. The next step in the methodology involves developing authentic activities in which the learning goals are implemented. This is followed by building an infrastructure that supports the pedagogical objectives and enriches the skeletal narrative to create a more authentic environment. Finally, used video cameras to monitor the activities; tracking the progress and effectiveness of the course.

5.1. Set Learning Goals

To establish learning goals, we built a model of typical tasks performed during an engagement and identified four areas for learning objectives in our training course: domain knowledge (objective information about the field in which trainees would work), communication, analytical and technical skills. We used these areas to elicit more specific goals from the consulting firm. We gleaned most of our information about the skills required for successful consulting through a minute analysis of a successful consulting case the firm had conducted in previous months.

5.2. Identify a Prototypical Case

As mentioned previously, in keeping with the authenticity of the environment, the course is based upon a real case that experts completed. Three criteria constrained our search for an appropriate prototype: typicality, atypicality, and data mass. Typicality elicits common elements of working within a domain. Atypicality

presents unusual challenges that makes a case interesting and develops true expertise within the trainee. Rich data provides material for trainees to study that is realistically complex.

5.3. Analyze the Prototypical Case

Once an appropriate prototype was identified, a narrative was distilled from extensive documentation of that case as a framework for the simulation. The narrative articulated a progressive account of what happened on the first day, what happened on the last day, and a causal story that lead from one to the other. In addition, domain and case-specific issues were identified in order to elaborate the learning objectives. For the second level of analysis, we derived from the prototypical case and from knowledge about the domain, a list of problems or issues including those that professionals commonly face, and those they faced in the field during the original case. The goal was to create a list of typical and anomalous problems requiring the trainees to use skills they need for expert practice.

5.4. Culminating Activities

Each set of skills for which the trainees prepared culminated in activities supervised by an expert in the field, either a coach or a mentor within the team depending on what skill was being exercised. The result of assessment of the activities was productive, individual feedback given to the trainee rather than a public, quantitative measure. We instantiated a number of these activities to facilitate feedback to the course participants including interviews with Verisel executives, process analyses development sessions, and various presentations before Verisel executives.

For example, on the final day of the first course, the trainees made their presentations before the Verisel executives and the actual operations committee of their consulting firm. The Verisel executives, familiar with the learning goals and data provided within the course, provided feedback pertaining to the recommendations that each team proposed.

5.5. Build a Supporting Infrastructure

We created the infrastructure of our course to organize a credible simulation of the prototypical case in which learners would face authentic problems in a realistic context. It had to allow them to receive guidance and opportunities for just-in-time learning from mentors. The infrastructure was the key to providing opportunity to facilitate cognitive apprenticeship, metacognitively aware instruction and provoke case-based reasoning.

There were four main components to this infrastructure: hierarchical team composition; fictitious clients, course staff and operators, and culminating activities focusing on specific skill sets from which participants would receive performance feedback.

1. Hierarchical Team Composition

The teams of participants were designed to reflect the structure of teams working in actual business engagements. Groups were created according to the consulting firm's practice model with varying levels of experience within each group. In the training, this mix of experience allowed more senior consultants to work on leadership skills while more junior members focused on data gathering and analysis skills.

The most senior members of each team were given three major goals to balance. The first was to behave as they would in the course of an actual engagement, so that trainees would experience a work environment as close to the real world as possible. In doing this they also served as role models for the junior team members to observe. The second goal was to encourage junior team members to work on projects outside their areas of expertise as they practiced within a risk-free environment, thus developing everyone's expertise. And finally, when fundamental misconceptions of junior consultants were revealed through client interactions, senior consultants would remediate this via just-in-time teaching with "war stories" conveying their expert experiential knowledge.

2. Fictitious Clients

Through our analysis of the prototype case, we discovered that consultants gain much of their information about their client company through "human" interaction. In the field, data is often gathered by conducting interviews and asking the client's employees questions as needed. Therefore, we needed to provide our novice consultants with role-play employees to answer their questions. To ensure that the live clients' answers to participants' questions would be realistic and useful in terms of pointing them towards the learning objectives/problems we had developed in the analysis stage, we developed scripts that corresponded to each issue included in the course. These issue scripts were used to identify opportunities in which learning through expectation failure could occur.

3. Staff: Course Operators

The first two courses were operated by course designers and consulting firm employees. Subsequent courses are being run by the host consulting firm alone. In gathering information, trainees used electronic mail to ask questions to the computer based clients. The course operators accessed a database of answers, based upon issues derived from the narrative, to respond to the e-mail questions. In addition, they were responsible for updating the database during and after the conduct. Course operators have the additional responsibility of aiding the hired "clients" with any questions they may have during the course, managing meeting times for interviews and presentations, and monitoring the conduct.

4. Staff: Coaches

We invited a corporate psychologist and a corporate communications trainer to participate in the course as coaches. The corporate psychologist acted as the team dynamics coach, focusing on issues surrounding team building. The corporate communications trainer acted as communications coach for the teams.

The intention was to provide both feedback and practice in metacognitive self-assessment to the trainees. Coaches gathered material through video monitoring and informal status meetings. The coaches met with team members regularly one on one to provide feedback. These meetings were conducted "in role" to the extent possible. For example, the communications coach would pull a junior consultant from a team meeting to request status briefings. These informal presentations as well as observations made while monitoring team sessions provided material for feedback from coaches as well as team and individual reflection. Other types of skills are assessed and remarked upon during the formal presentations on the final day of the conduct.

5.6. Video Monitoring

We placed video cameras in the large group rooms where the teams met, did most of their work, and interacted with Verisel clients. The cameras were linked to monitors in the course operation room for a variety of purposes:

1. To allow coaches to assess and respond to participants' performance. This was fairly effective. By watching the monitors, coaches were able to prepare appropriate commentary to be given immediately after the presentation.

2. To allow course operators to assess and respond to participants' performance. Course operators could choose to alter the foci of the training in response to student needs. Additional practice sessions could be incorporated into the course as a result of these observations by having on-line or live clients request certain types of information.

3. To allow course operators to anticipate participant's questions. Students were allowed to ask questions in any area, and they expected realistic responses from clients. Monitoring conversations greatly increased the ability to provide realistic responses in a reasonable time. By the time the participants sent in their questions or requests, course operators often had the answers and/or documents prepared.

4. To increase performance pressure for participants. The trainees were aware of being monitored on video. The cameras made them aware of the course and therefore encouraged them to take it seriously.

5. To allow course designers to assess the effectiveness of the course. For us, the ability to see every presentation and its aftermath was invaluable. We knew how successful the trainees were immediately after, if not during, each event.

6. Results: Successes, Lessons Learned and Recommendations

We used two methods to gather information needed to assess the effectiveness of the course: observation of team meetings, and a facilitated focus group. The course designers were a regular presence in meeting rooms as teams worked together and met with clients. This form of observation augmented observations made through video monitoring.

After the final presentations and trainee feedback from Verisel clients and members of the consulting firm's Operations Committee, the course participants were asked to evaluate the course. We facilitated an out-of-role, informal discussion between course participants and designers. It focused on general lessons of business process re-engineering that the trainees extracted from the course and on the effectiveness of the course in other aspects. The trainees compared and contrasted the completed case experience with other business consulting engagements. In general, we asked what aspects of the course worked and did not work. The participants' feedback helped shape future designs of the course.

6.1. Successes

The trainees found the course to be authentic and engaging. All elements of the course including real and virtual clients, data, and schedule of activities effectively contributed to a realistic consulting environment. Less experienced trainees expressed the value of practicing basic skills such as process mapping, interviewing, and presentation skills supported directly by the infrastructure. Some junior participants complained that their performance was inhibited by the complexity of tasks. If they had been able to work on the sub-tasks one at a time, they would have performed much better. The senior participants, on the other hand, were very pleased by exactly this point. The complexity of the course felt very familiar to them. It matched their real-world experience. A few of the junior consultants remarked that it also provided the sort of realistic, yet safe, context for questions and situations to arise and mentors -- partners, senior staff, and, indirectly, clients -- to respond accordingly, thus allowing just-in-time learning to take place. We also noticed that learning took place through little epiphanies, signs that the participants were noticing themselves learn.

6.2. Lessons Learned

7. Conclusion

In this paper we described a methodology for designing simulation-based training courses. This methodology incorporates theories of teaching and learning, including case-based reasoning, Cognitive Apprenticeship, metacognitively aware instruction, and Goal-based Scenarios into the design of complex, mentored learning environments. It dictates that courses should be modeled after company and industry practices, thereby facilitating the learning of easily transferable skills. Furthermore, the complexity and authenticity of the learning environment facilitates the compilation of cases for future reference, domain knowledge, analytical skills, and communication skills.

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