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THE VIRTUAL INTERACTIVE PROJECT: TEACHING ANALYSIS AND DESIGN THROUGH NARRATIVE AND DRAMA

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ABSTRACT

A team-based project is a common feature of information systems courses involving analysis and design. The use of a project assignment helps to promote active learning through hands-on engagement within a collaborative learning context. Various strategies are available for staging such projects including field projects and projects based on written cases. Each of these options tends to have advantages and disadvantages, relative to the richness of the experience and the predictability and reliability of learning outcomes. This paper reports on an innovative approach, the Virtual Interactive Project (VIP), that explores the middle ground between field projects and text-based projects in an effort to achieve some of the advantages of both. Like the text-based project, the VIP is launched by means of a written case; however, this case gives only enough facts to get the project underway. The project then evolves through web-based and e-mail interaction between students and a "virtual client" representing the firm in the case. By engaging students as players in an unfolding story the VIP becomes, in effect, "drama" and amplifies active learning by tapping the centrality of narrative in knowledge construction. Early experiences with the Virtual Interactive Project are described, and some directions for its further development and application are suggested.

KEYWORDS: analysis and design, active learning, situated learning, narrative

I. INTRODUCTION

A term project, carried out in teams, is commonly the centerpiece in undergraduate information-systems courses that involve analysis and design. Such courses include those focused specifically on analysis and design, but also other types of courses where analysis and design is an important component. The latter can include, for example, courses on database management and web application development, or any other course that involves the analysis of business problems and determination of user requirements for system functionality.

The extended nature of a term-project assignment permits students to engage in a more complex, realistic, and potentially ambiguous problem than narrower exercises can provide. The project can be designed to demand a more challenging and creative application of the tools used in analysis and design. Also, the project can supply an experience in integrating activities across the lifecycle of a single systems-development effort. Beyond these relatively technical aspects,

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the project can also give students an opportunity to learn about the crucial social and communication aspects of systems analysis and design, among team members and possibly with clients. Thus, students can learn something about the advantages gained from the marshalling of diverse skills and perspectives; about the coordination of differentiated roles in the accomplishment of complex tasks; and about individual skills and mindsets needed for collaborative work. In short, the term project can provide a more realistic model of the collective processes that students will encounter in the workplace than individualized learning activities alone can afford.

On the other hand, there are more and less effective ways for a faculty member to stage the term project. This paper considers some of the advantages and problems inherent in the conventional options in the light of emerging concepts in educational theory and research. It then reports on an approach, the Virtual Interactive Project (VIP), which seeks the middle ground among the traditional options in an effort to capitalize on some of the advantages of each. The approach is outlined, and then early experiences with the VIP are described. Finally, some directions for further development and application of the VIP are suggested.

II. SITUATED LEARNING AND THE TERM PROJECT

The term project represents an attractive occasion for the promotion of learning that is active, situated, and social. Active learning recognizes that [Elmore, 1991: xii].

People learn to the degree to which they can actively manipulate facts within some general framework and can relate general ideas to specific events in their experience. We have knowledge, in other words, only as we actively participate in its construction.

Active learning is thus in contrast to the traditional model of learning that separates knowing from doing, and treats knowledge as abstract, de-contextualized ideas. The latter underwrites the still-dominant, teacher-centered strategy for pedagogy, where the principal method involves "information transfer" through declarative statements to students, whom are taken for the most part as passive receptacles [Brown et al., 1989; Bruffee, 1993; Garvin, 1991]. The principles of active learning have been recognized for some time [e.g., Dewey, 1938]. However, their application in teaching practice, particularly for adult learners, has been slow to take hold [Christensen et al., 1991]. On the other hand, the strong predisposition in the IS teaching community toward hands-on work, including term projects, suggests that our community enjoys a promising culture for the further development of active learning strategies.

Another key insight from educational scholarship is that learning is fundamentally contextual. The idea of context applies in three principal ways [Elmore 1991]:

- First, taken in themselves, the ideas constituting new knowledge must appear in a sensible relationship to one another.
- Second, acquiring new knowledge depends on the learner being able to find a place for it within the context of what s/he already knows.
- Third, to be usable (that is, to be applicable in solving future problems) knowledge must be acquired in the context of concrete problem-solving [Whitehead, 1929].

Concrete problem-solving, which is where the term project makes its central contribution, calls attention to the idea that learning is most effective when it is situated, that is, where the learner engages in problem-solving activity in the context of authentic situations [Brown et al., 1989; Bruner, 1990; Lave and Wenger, 1991; McLellan, 1995]. Thus, what is learned depends integrally on how it is learned. As John Seely Brown and co-authors remarked [1989: 32], "Situations might be said to co-produce knowledge through activity."

What constitutes a situation, of course, will vary in nature from one type of context to another. A useful way to think about the situation presented by systems analysis and design, and

one that draws upon some of the pedagogical elements identified by researchers in active learning, is to consider the situation relative to three principal aspects (Figure 1). These are:

- the substantive business domain and business problem motivating the project;
- the tools and techniques that the students must learn to use in understanding the problem and crafting potential solutions; and
- the social context and processes through which the students and other key parties collectively work.

Figure 1. Aspects of the Situation in Situated Learning of Analysis & Design

The business problem is what the students ostensibly work on, and it is perhaps what occurs to us first when prompted to think about the "situation" in which situated learning in systems analysis and design takes place. However, the situation is also shaped by the tools and techniques with which the learner engages, because of the way in which a portion of complex cognitive tasks is commonly off-loaded on to the environment [Brown et al., 1989: 37]. This phenomenon was identified and described by a number of researchers, perhaps none so clearly as Hutchins, whose study of navigation practice [Hutchins, 1995] outlines in crisp detail the distribution of cognition both across a navigational team and the physical artifacts the team employs. Navigational tools – the astrolabe, the alidade, the gyrocompass, the fathometer, the nautical slide rule, the innumerable charts and maps – thus serve as "repositories of knowledge" [Hutchins, 1995: 96] in which the observations, insights, decisions, and calculations of the predecessors of today's naval navigators became inscribed. Within systems analysis and design, of course, we have our own distinctive collection of tools (data models, use cases, dialog-flow diagrams, and the like), and our students' learning of principles and practices is inseparable from their practical engagement with such tools.

Also crucial to the promotion of situated learning is the recognition that the situation in question nearly always contains an important social dimension [Bruner, 1986; Vygotsky, 1978]. As knowledge concerning complex work tasks is socially distributed [Bruner, 1990; Hutchins, 1995], learning about such tasks, too, is a shared activity in which knowledge is not so much transferred as mutually constructed [Bruffee, 1993; Dewey, 1938; Garvin 1991: 5]. As Elmore remarks [1991: xiv], "Another important insight from current research on human learning is that the acquisition and application of knowledge are fundamentally social acts."

The term project in analysis and design, of course, presents an opportunity to leverage the social aspect of learning based on interactions among team members, the faculty member(s), and possibly client(s). Moreover, the social-process dimension of the project is not apart from students learning about the tools of the trade. To the contrary, acquiring knowledge of the tools

employed in a community of practice depends on the student learning to use those tools in the appropriate social context.

Learning how to use a tool involves far more than can be accounted for in any set of explicit rules. The occasions and conditions for use arise directly out of the context of activities of each community that uses the tool, framed by the way members of that community see the world. The community and its viewpoint, quite as much as the tool itself, determine how a tool is used. ... Because tools and the way they are used reflect the particular accumulated insights of communities, it is not possible to use a tool appropriately without understanding the community or culture in which it is used. [Brown et al., 1989: 33-34]

Thus, the term project in systems analysis and design can be a productive occasion not only for teaching the procedural use of tools and techniques, but also for the larger socialization and enculturation of students.

In summary, the term project offers an opportunity to engage students in the kind of collective problem-solving and learning encountered in industry practice, around business problems of some complexity, and using tools in a context defined by realistic application and teamwork. Indeed, where analysis and design is concerned, the fit between situated learning in the classroom and professional practice approaches the ideal. Systems analysis work, even for the most experienced practitioner, is an on-going process of active, situated learning. Rather like an anthropologist exploring and documenting a succession of unfamiliar cultures, the analyst embarks on a career based necessarily on the continual extension of his/her knowledge of diverse business problems, technologies, and social contexts, through the skills of "questioning, listening, and responding" [Garvin, 1991: 10] at the core of active learning.

On the other hand, as those of us who use term projects in our classes recognize, achieving the aforementioned benefits is problematic. To a significant degree, success in accomplishing situated learning through the term project depends on the project's *authenticity*, that is, on how well it sets the stage for introducing students to, and engaging them in, the "ordinary practices of the culture" [Brown et al., 1989: 35] of systems analysis. For many of us, our main preoccupation in this regard is that we present an appropriate selection of up-to-date tools and techniques (Figure 1). While this emphasis is certainly important, we perhaps too commonly fall short on one or both of the other dimensions of situated learning, specifically, presenting business problems of sufficient richness and fostering social processes of realistic complexity and ambiguity. In the next section, then, we consider the traditional options for the term project in the light of this idea of achieving authenticity in the business problem and the social context.

III. TRADITIONAL PROJECT OPTIONS

Traditionally, two primary options for conducting the term project present themselves, each having a number of possible variations. Students may work on a purely written (text-based) project case; or students may pursue field projects with actual clients, which they either line up for themselves or have the instructor arrange. In considering the advantages and disadvantages inherent in each of these options, we consider not only the issue of authenticity but also two issues related to pedagogical control that we will call

- targeting and
- reliability.

The latter, which faculty with experience in teaching projects will recognize, are persistent practical concerns in orchestrating a satisfactory learning experience in analysis and design. The following discussion elaborates on the overview given in Table 1. (This table includes a column for the virtual interactive project, which will be discussed later.)

Targeting is a matter of fitting the students' experience in the project to the learning objectives of the course. That is, students should engage not only in an authentic situation, as defined above, but also one that is pertinent to the mission at hand. What this mission is naturally depends on the type of course. For a systems analysis and design class, the mission will likely

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Table 1. Relative Advantages of Traditional Term Project Approaches

	Written Case Study	Field Project	Virtual Interactive Project
Targeting	focused	problematic	focused
Reliability	high	problematic	high
Authenticity: business Problem	controllable	high	controllable
tools and techniques	adequate	adequate	adequate
social processes	deficient	naturally rich	enriched

include an interesting degree of complexity in business processes and data, as well as sufficient variety in aspects of the user interface. In a database management course, the focus will be on such factors as richness in the data structure, variety in the data types required, and a range of opportunities for defining integrity constraints.

Targeting is clearly more straightforward using written cases, as the instructor can select one or more cases (or write them) specifically with an eye toward including particular learning challenges (e.g., in process modeling, data modeling, interface design). This task is made easier by the availability of case collections written specifically with analysis and design activities in mind [e.g., Dewitz, 1996; Hunter, 1998; Trower, 2000]. Field projects with real clients are more problematic to target appropriately, as such projects may fail to surface issues that significantly engage the core concepts and techniques covered in the course. Thus, for example, in the classical analysis and design course one or more of the crucial elements (e.g., process modeling, data modeling, interface design) may substantially be missing. This hazard may be ameliorated, to a degree, by the instructor reviewing student projects up-front for relevance; even stronger pre-screening can often be attained when the instructor makes the initial client contacts and lines up candidate projects. Nevertheless, systems projects being what they are, unpredictability still obtains. This situation is in contrast to the written case, where "what you read is what you get."

With respect to reliability, instructors are frequently confronted with two concerns: first, consistency, and therefore comparability, of learning opportunities across teams; and second, operational factors that may affect a team's ability to complete the project assignments. Once again, because written cases are static and complete from the outset, they can be selected and assigned with consistency and comparability specifically in mind. In fact, consistency can be ensured by assigning a single case to all teams in a class. Projects based purely on written cases are also not prone to disruption from outside events. Field projects, on the other hand, face exposure on both counts. Within a given class, they will often vary significantly in their quality as learning opportunities. Moreover, field projects selectively suffer problems with students getting needed client access or being able to control the schedule so as to meet project timelines. Where the onus is on students to line up their own projects, some may have difficulty up-front simply in identifying and engaging a potential client. Such differences obviously can lead to inequities in substantive learning as well as difficulties in grading fairly.

Whereas written cases appear to have the edge relative to targeting and reliability, they cede the advantage to field projects when it comes to authenticity. Authenticity, in this context, again has to do with how well the situation (as in situated learning) engages students in the ordinary practices of the culture. Authenticity depends in turn, as we have seen, on the character of the business problem, tools, and social processes encountered in the project (Figure 1). Now, a well-written case can do a very good job of presenting a complex, nuanced business problem. A written case, in fact, can sometimes deliver greater richness (replete with ambiguity) than most student teams can garner through client interviews, given the limited time usually available to students for field interviewing. The tools aspect, meanwhile, is usually invariant: whether the project is based on a written case or fieldwork, the same tools are used. Accordingly, it is in the social-process dimension that the field project surpasses the written case in authenticity.

Central to the experience of analysis and design in industry are interactivity and discovery. These tasks are inherently about "finding out" by means of social interaction, both with

technical team members and with business clients. (Again, consider the anthropologist analogy.) The written case, of course, has only paper (and usually fictional) business people, and there is therefore no interactivity in that quarter. As a result, written cases are also typically complete and closed-ended, since there are no users to consult about unknown or ambiguous issues. The effect is that discovery largely reduces to a matter of reading.

Enculturation of students, it was argued earlier, is integral to our teaching mission [Brown et al., 1989]. Our efforts in this regard get a boost when we can introduce students to the experience of working with clients in the important boundary zones between the IS subculture and subcultures on the business side of organizations. The field project affords the opportunity to do this, while the project based on the written case does not.

IV. THE VIRTUAL INTERACTIVE PROJECT

Were it not for the difficulties in pedagogical control relative to targeting and reliability, the field project would provide the ideal format for students' analysis and design experience. It certainly remains a viable and attractive option, particularly where close faculty monitoring is practical. However, where it is more feasible to build such control into the basic structure of the project, faculty tend to default to the written case. In this section, we examine an innovative approach to the project that takes the written case as a point of departure, but then extends the format. We will call this approach the Virtual Interactive Project, or VIP. Assisted by the use of some straightforward technology, the VIP brings in a significant element of social process while continuing to leverage the advantages in focus and control provided by the traditional written case (Table 1).

The VIP draws on a variety of existing practices in information-systems education, including role-playing among project participants and the use of an integrated case in which new content is progressively rolled out over the course of the project. In outline form, the VIP proceeds as follows. Students are given a written base scenario that introduces the business in question and conveys a feeling for the business problem that will provide the focus for the project. Only preliminary details about the problem are furnished. Students, acting in teams as "consulting firms," are then directed to contact a "virtual client" for the additional information they will need during the course of the project. Within the context of the case story, the virtual client is a well-placed manager within the firm. The virtual client, who is played by the instructor or another person, is available to answer student questions and otherwise dialog with the students through electronic mail. Substantial chunks of additional case material can be delivered, as needed, through client memos that are posted to the course website.

The VIP is "virtual" in at least one sense, and typically two. First, the case is electronically mediated, since the client and students never meet face to face, but instead do all their communication through e-mail and the web. Second, the case may be about a fictional rather than an actual business. In practice, the case will often be something in between, as a kind of fictionalized rendering based on the facts concerning one or more actual businesses.

In this section, we consider in greater depth what is required to stage the VIP. We begin from a process point of view by likening the VIP to storytelling and theater, and drawing on associated theory addressing narrative and drama in social context. Then we consider some operational issues.

THE VIRTUAL INTERACTIVE PROJECT AS DRAMA AND NARRATIVE

*All the world's a stage,
And all the men and women merely players:
They have their exits and their entrances;
And one man in his time plays many parts...*

William Shakespeare, *As You Like It*

For the IS faculty member, overseeing a term project assignment is in some ways like staging a play. But a systems project in industry, too, is like a play, as is social interaction in The Virtual Interactive Project: Teaching Analysis and Design through Narrative and Drama by N. Ramiller

many other types of structured situations [Burke, 1969; Feldman, 1995; Goffman, 1959, 1967, 1974]. So the term project and the industry project have some dramaturgical similarities. In both cases participants occupy, and help to create, particular roles; they acquire the substantive knowledge and learn the expectations associated with those roles; and they learn how to present images, or personae, appropriate to those roles. Making sense of one's self in relation to an assumed role is also commonly joined to a process of identity construction [Weick 1995; Goffman, 1959]. With increasing skill in creating the role within the context of real activity, the participant comes to incorporate the role as an integral part of his/her identity. The term project can provide students, as "dramatic participants," with a significant opportunity to take a positive step toward identity construction as systems professionals. Taken in overview, then, the term project represents a kind of "rehearsal" in which students prepare for a future in which they will assume the social identity of analyst/designer and share in the collective responsibility, as members of heterogeneous project teams, both for building systems and for constructing sensible team interactions.

Integral to the "drama" of the term project is narrative, since within any drama there is a storyline, or a sequence of events, and a plot that helps the action that takes place to make sense as an inter-related whole [White, 1981; Polkinghorne, 1988; Ramiller, 2001]. It is also useful for the instructor to think about the project in terms of storytelling. Within the VIP, the principal storyline is shaped by the tasks and deliverables to be accomplished in the project. Students, client, and instructor, then, learn and actualize their particular roles in interaction with one another during the course of this unfolding series of related events.

Narrative is a fundamental way in which humans know things and share that knowledge with one another, since narrative is a principal means by which humans "endow experience with meaning" [Bruner 1986: 12; Weick, 1995]. In making sense of the events around them and their own actions, "people narrativize their experience of the world and their own role in it" [Bruner 1990: 115]. Narrative, too, is "a form of self-presentation in which the teller is claiming a particular kind of self-identity" linked to the cultural values that support it [Polkinghorne, 1988: 165]. Moreover, an individual comes to understand others' grasp of the world and their place within it in great part through the stories they tell.

While narrative is thus linked to sense-making and learning in social life generally, it also has a central place in situated learning within the university classroom [Brown et al., 1989: 40].

Within a culture, ideas are exchanged and modified and belief systems developed and appropriated through conversation and narratives, so these must be promoted, not inhibited. Though they are often anathema to traditional schooling, they are an essential component of social interaction and, thus, of learning.

The "circulation of narrative" [Brown et al., 1989: 40], then, is crucial to the wider goal of enculturating students.

When we turn to analysis and design, specifically, the importance of narrative in real systems development is increasingly being recognized. In addition to the role of narrative in participants' efforts to legitimate and rationalize project actions and outcomes [Brown, 1998; Brown and Jones, 1998], the production of narrative is also being located and documented in the on-going conduct of projects. For example, research is now identifying a central role for narrative activity among users in the requirements analysis process [Alvarez, 2001]. Users, in short, tell stories in their efforts to communicate their needs, frustrations, aspirations, and coping strategies with analysts.

Storytelling is directly relevant for the staging and conduct of the VIP. If storytelling is an important aspect of the analyst-user interaction in real practice, then in the interests of authenticity the virtual client in the VIP should have stories to tell, as well. In fact, client stories can be situated at two levels in the VIP.

- First, the virtual client has a story to tell about the business overall and its problems and opportunities.

- Second, the virtual client can also provide mini-narratives that reveal important aspects of specific problematic processes and issues in the business.

Accordingly, we see that while the term project itself is a kind of drama or living narrative which the participants themselves cooperatively build as they go along [Ricoeur, 1981], it also embeds other narratives. The result, when these narratives are joined together, is a layering of narrative, as suggested by Figure 2. The faculty member should be alert to the narrative possibilities in all of these layers, because they represent opportunities for enhancing the term project's learning value.

Figure 2. Layering of Narratives in the Virtual Interactive Project

For the instructor, then, the basic challenge in staging the VIP is a matter of structuring and filling in the project's narrative layers. As noted earlier, the larger drama of the term project, represented by the outer circle in the figure, is shaped by the structure of assignments and activities, as well as by the on-going interaction among instructor, students, and virtual client. The virtual client's larger business-problem narrative, then, is introduced in the base scenario and subsequently elaborated by means of memos and other communications. Finally, the client's communications represent an opportunity to raise particular issues in story form, as suggested by the inner circles in the figure.¹

¹ While a "narrative-aware" approach to the term project is consistent with a socially more authentic staging, it is also worth noting that it readily supports the teaching of analysis and design from the point of view of alternative systems-development paradigms (Hirschheim & Klein, 1989; Orlikowski & Baroudi, 1991; livari et al., 1998). Despite what are sometimes our contrary intentions, the practical need to use much of our precious class time for teaching tools for formal representation (DFDs, data models, class diagrams, and the like) tends to drive our classes

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"STAGE DIRECTIONS "

In setting up and conducting the VIP, the instructor needs to think about a number of operational issues. We will examine, in turn, the following practical concerns:

- structuring the project
- developing the content
- controlling complexity
- promoting verisimilitude
- "casting"
- motivating participation

STRUCTURING THE PROJECT

Organizing a term-project timeline, defining deliverables, and creating assignments are tasks familiar to experienced faculty. The particulars vary, of course, along such dimensions as subject matter, the specific learning objectives for the class, and the time available. Such variability notwithstanding, the shift to active and cooperative learning entailed in the project does not obviate the need for structure. To the contrary, even as the focus of control over task execution shifts more squarely to the students, a consistent framework for the integration of tasks becomes all the more crucial [Miller et al., 1996; Smith, 1996].

In general terms, a useful way to think about the VIP from a logistical point of view is as a problem in managing a heterogeneous document stream (Figure 3). As noted earlier, the case is launched by means of a base scenario that describes the business in question and sets up the search for potential problems in current business processes. A series of assignment sheets, issued over the course of the project, then guides students in producing the project deliverables. Follow-up client memos, posted at the course website, expand on the story of the business and its problems and thereby help point the way on specific assignments. The instructor provides clarifications and otherwise helps to guide the project by means of announcements made during class session and written bulletins.

Student teams send their questions about the business via e-mail to an address specifically established for the virtual client. The instructor, if s/he is not serving in the role of the virtual client (see below), reviews all the e-mails exchanged and may consult with the person playing virtual client ahead of time on selected responses. This helps to keep the overall effort on track, and can also give the instructor insight into any misunderstandings that the teams may be suffering from. These misunderstandings can then be corrected by means of instructor bulletins or class announcements.

DEVELOPING THE CONTENT

The documents and communications depicted in Figure 3 carry the content of the business story that is the basis for the analysis and design effort. The contents will be unique to each case, and naturally must be geared to substantive learning objectives. Illustrations of content are presented in the next major section of this paper.

A tactical issue relating to content concerns how much detail should be provided in the Base Scenario. The answer is: enough to foster initial understanding but not as much as a typical text-based case. It is crucial to leave gaps and ambiguities that students must fill through interaction with the virtual client. The same is true for subsequent client memos. The level of detail is a means to control both the degree of challenge for the students and the ensuing workload on the person playing the virtual client role.

toward the dominant "software-engineering" model (Alvarez, 2001). Taking storytelling seriously, in staging the term project, is a good way to surface the intrinsically interactional aspects of analysis and design. It also provides the opportunity to introduce students to the reality of multiple perspectives, values, and goals in real projects, to the shared and collective nature of learning and problem-solving in systems projects, and to the "native" forms in which users represent business situations and problems.

Figure 3. Managing the document stream in the Virtual Interactive Project

CONTROLLING COMPLEXITY

Faculty who teach analysis and design based on projects for real clients discover that such projects can quickly become overwhelming for students, given their skill level and the time available. Because it is relatively open-ended, the same thing can happen with the VIP. Accordingly, the instructor needs to control the complexity as the case unfolds. The basic objective is to present an interesting challenge that compels students to seek answers but does not completely overwhelm them. In projects in which data modeling plays a part, the complexity of the resulting data model can often serve as a rule-of-thumb for the overall complexity of the analysis and design problem, since the work required on other tasks tends to expand with the number of underlying classes and attributes.

PROMOTING VERISIMILITUDE

As noted earlier, authenticity is best accomplished by students working on real projects with real clients. On a related front, authenticity is why many of us strongly encourage students to engage in corporate internships, as part of their overall program. The VIP, meanwhile, remains a simulation. In orchestrating the VIP we come closest to authenticity by minding verisimilitude² in the documents and communications that build up the business story over the course of the project. Things to attend to in strengthening verisimilitude are

- the substance of the overall story itself,

² "The quality of appearing to be true or real." *The American Heritage Dictionary of the English Language*, Fourth Edition, Houghton Mifflin, New York, 2000.

- writing style, and
- the use of mini-narratives.

Substance. Relative to the substance, the story should carry a degree of realistic detail – though, again, not so much detail as to create problems with excessive complexity. Thus, the base scenario and client memos should describe the business or business area rather thoroughly, raise a number of problems or issues, and include business documents and sample data. Realistic detail is most readily achieved by writing from personal experience and observation. The case need not represent a specific business situation with which the faculty member is directly familiar, but it should certainly draw on tangible experience in other business contexts, as the early VIP trials, described in Section V, illustrate. The first, a Disney collectibles business, was a fabrication based on observations at relevant websites, plus the prior small-business experiences of the author and the industry colleague who played the virtual client. The second, a baby consignment shop consortium, drew on close observations by the same industry colleague as a retail customer of similar businesses. The third, a cultural resources management facility, was based on the author's experiences in an earlier career in contract archaeology.

Writing Style. Achieving verisimilitude depends on being able to project a distinctive "voice" [Zinsser, 1976], so that the fiction of the virtual client comes across to students in a consistent and convincing way. The client's communications, in the form of memos and e-mail responses, should read more or less as if the client is actually talking – and, indeed, talking as a business person. Examples of the appropriate style and tone appear, in the discussion of early trials in Section V.

Mini-Narratives. One device that can help to achieve realistic client voice is the incorporation of mini-narratives, little stories, in the client's communications that address specific problems or issues. These correspond to the innermost circles shown in Figure 2. As noted earlier, clients and users indeed communicate this way in real practice. Section V also highlights some examples of such mini-narratives.

"CASTING"

Casting is the question of who should play the virtual client. It is possible for the instructor to play the role of virtual client, and write the client memos and respond to student e-mails him/herself. This approach provides a single point of control and can help ensure consistency, but it can also pose challenges in maintaining a distinctive client voice. Another attractive option is to enlist an academic or industry colleague to play the virtual client, which offers the advantage of bringing another perspective and additional creative energy to the construction of the business story. (It also avoids the issue of having to prevaricate about the identity of the virtual client.)

If the instructor does not play the part of the virtual client, the issue arises of who should. All other things being equal, an academic colleague in IS or an experienced analyst may be preferred in this role. This choice relates to the problem of controlling complexity, as the individual in question should have a good feeling for how the addition of more detail on the business side increases complexity relative to the project's formal modeling demands.

Many colleagues from the "business side," either in the academy or industry, will tend to underestimate the true complexity associated with their own domain knowledge, at least as it impacts formal modeling work. An additional concern, when another person plays the virtual client, is that the instructor and partner coordinate sufficiently closely, so that the necessary consistency in client-related materials (e-mails and memos) and their fit to teaching objectives can be assured. A final practical concern is that the partner must have sufficient time to devote to communicating with the students, and be able to respond in a timely way. (The burden on the virtual client and its implications for the practicality of the VIP are discussed in Section VI.)

MOTIVATING PARTICIPATION

Faculty who have tried to introduce students to the case-discussion method will recognize that the effort to deploy active-learning techniques is an uphill battle. In most circumstances, faculty will be dealing with students whose prior educational experience has

trained them to be the passive receptacles that traditional teaching approaches in fact assume them to be. Students will view it as risky to conduct themselves otherwise [Garvin, 1991]. Against this background, the instructor needs to think deliberately about measures to motivate students to interact with the virtual client. Although students should most certainly be informed that the quality of their deliverables (and hence, their grades) will depend on their communication with the client, this fact alone will not be enough in most cases to overcome their trained-in passivity. Students will, on the whole, be passive even against their own best interests. Other measures, accordingly, should be taken.

Possibly most effective is to make the VIP a part of a larger teaching strategy that involves an entire suite of active and collaborative exercises, including smaller-scale group work and in-class activities, and that simultaneously de-emphasizes traditional lecture and isolated individual work [Adam and Hamm, 1990; Bruffee, 1993; Johnson and Johnson, 1989, Johnson and Johnson, 1991; Johnson et al., 1991; Miller et al., 1996; Smith, 1996]. The VIP will then fit naturally into an overall pattern of learning in the course.

More crudely, communications with the client can be incentivized directly through the awarding of participation points. The granting of points, of course, needs to be based on the quality of students' communiqués, as well as the quantity, so as to discourage frivolous messages.

Finally, it is also important, as noted above, to offer a base scenario and client memos that are strategically incomplete. Students must have good substantive reasons for contacting the virtual client, reasons that make sense in the context of the project work, so that client interaction is more than merely an exercise in form.

V. EARLY EXPERIENCES

To date, the VIP has been tried out and evaluated in a systems analysis and design course (one section) and a database management course (two different terms, two sections each). These are quarter-term courses that are part of the core requirements in the information systems major at the author's business school. Class sizes in all cases ranged in the twenties. Students were predominantly senior-level undergraduates who had completed at least three or four prior courses in information systems, including programming classes and a data-communications course. This section describes these early trials, to illustrate the operational points made in Section IV and to reflect on some of the insights gained.

FIRST TRIAL: GROWING PAINS AND SYSTEM SOLUTIONS

The first trial took place in a single section of an introductory systems analysis and design course, involving seven teams consisting of three or four members each. A senior systems analyst with 15 years of industry experience played the role of the virtual client. The author developed the basic story concept and created the assignments, while the industry partner wrote the base scenario. The author and industry partner collaborated in writing the client memos. The overall project timeline was structured in the conventional way around a series of inter-related assignments, including a baseline project plan, a data structure analysis (data model and data dictionary), a process analysis (DFDs and accompanying process specifications), and user-interface design specifications. These outcomes were collected from the students along the way, scored satisfactory/unsatisfactory (primarily based on diligence-of-effort), and returned with comments to the teams. The students revised and updated these documents as directed by the instructor, and brought them together in a project notebook, which they submitted at the end of the term as the ultimate project deliverable. In contrast to the interim deliverables, which were assigned a small amount of credit, the final project notebook was a large component of the course grade. The project notebook was evaluated based on its thoroughness, business accuracy, effectiveness in the use of the analytical tools, and clarity of communication relative to its main audience, the client.

In the story's basic plotline, an entrepreneur owns and operates a business buying and selling Disney-related memorabilia. She developed a large network of contacts for acquiring her products, and she also roams the countryside attending collectors' expos and estate sales. A small staff assists her in processing orders, managing inventory and shipments, and marketing.

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Her business, which is managed primarily on the basis of paper records, is now so large that problems in inventory control and customer tracking are starting to occur. The advent of the web also poses a threat – and an opportunity. Figure 4 shows the first few paragraphs of the base

Systems Analysis & Design

Term Project: Base Scenario

Introduction

Annette owns a small Pacific Northwest mail order company called DisneyStuff that deals in Disney memorabilia. The items sold vary from low (\$5.00) to high-priced (over \$1000). Some are one-of-a-kind items such as autographs and props from Disney movie productions. Some are limited edition items such as pose-able Mickey dolls made in the 30's and 40's. And some are mass-produced items, such as pin-on buttons showing Disneyland, Mickey, Goofy, etc. All items are collectibles, and none can be found in the Disney store or Disney catalog.

Annette employs 6 people. Nancy, John, Brad, and Babette are all part-time employees and do all the order processing. Nancy and John work from 8 am to 12 noon. Brad and Babette work between 1 pm and 5 pm. The office is closed between 12 and 1 for lunch. Annette's only full-time employee is Cindy, who is in charge of inventory, order status reporting, billing and accounts receivable. Matt, the sixth employee, takes care of shipping and receiving. This is also a part-time position, with Matt working from 1 pm to 6 pm each day.

Acquisitions

Annette spends about half her time scouring the country for new items to add. She also handles "special orders" – those orders that can't be fulfilled from existing inventory. In these cases, she develops a personal relationship with the customer, and manages the entire process through to its conclusion. Often in these cases, the customer may have to wait several months, while Annette locates the item. Acquisitions is what Annette really enjoys – after all she started the business because she was a Disney memorabilia collector herself. This allows her to collect on a massive scale.

Marketing

Annette puts out a catalog monthly which she sends to the people on her mailing list. The mailing list consists mainly of people who have ordered items from her before. She has grown her customer base for the most part haphazardly, based on personal contacts and word-of-mouth. She has, on a few occasions, placed small ads in the back of collector magazines, in an effort to solicit requests for her catalog. The catalog is black and white. At the back of the catalog is included an order form, which customers can use to order items. Customers usually fax, but sometimes mail, these forms in.

Annette also has a web site which her 13-year-old son put up for her last January. It is a one-page site which gives a 1-800 number the customer can call to request a catalog or place an order. Over the summer, her son enhanced the site by adding some cool animation, showing Mickey walking across the screen, followed by Donald Duck and Huey, Dewey and Louie. So far, the web site has not generated any appreciable business. ...

Figure 4. Opening Paragraphs of the Base Scenario, First Trial

scenario, which gives a feeling for the level of detail provided and the writing style. The base scenario, which runs to several pages and includes several forms and reports with sample data, was distributed in class as a handout and also posted for downloading at the course website.

Students sent some two dozen e-mail messages to the virtual client. An example appears in Figure 5, which illustrates both the tone adopted in the virtual client's writing and the use of a mini-narrative. (Note the brief passage beginning, "One time I remember...")

From: **disneystuff@worldnet.att.net**

To: [student's e-mail address suppressed]

Subject: Re: Shipping

Corrina,

Well, gosh, we've spent a lot of time learning what the best thing is to do when we need to ship part of an order. Finally, we've come to the place where we send them a packing slip that indicates the order number and all the ordered items, and for each item, whether it is in this shipment or not. One time I remember it got really weird: a customer ordered about a dozen items. We ended up needing to ship it in three shipments. In that case, each packing slip repeated all the items in the order and indicated whether or not they were "included in this shipment", "backordered", or "shipped previously".

Annette

> Hi Annette!

>

> We were wondering what information you send to your customers when

> you ship their order. Do you send a packing slip and/or an invoice?

> Or is there something else you send? What is your process when you

> send a customer part of their order, and have to tell them that you

> don't have the rest yet?

>

> Thanks for your help,

> Corrina

Figure 5. A Sample E-mail Exchange

Students' e-mails covered a range of issues. Although most sought clarifications about basic business processes or the types of data being captured and recorded, a few messages asked about wider organizational issues, such as the background and trainability of employees, whether the owner was looking to cut staff, and what marketing ideas the owner had. The virtual client answered each inquiry within a day of its being sent. She was able to answer most student inquiries without first consulting the instructor. Occasionally, the virtual client and instructor conferred on responses. In all cases, the instructor was copied on the messages exchanged. A few times an exchange of messages prompted a follow-up communiqué from the instructor to the student team in question, offering additional clarification and guidance, or to a more general announcement in a class session. E-mail exchanges were kept confidential to provide a competitive reward for engaging with the client and asking good questions. (The competitive value of these exchanges was not lost on the students. One especially competitive team added "CONFIDENTIAL" to the subject line of its messages.)

Although a number of students' inquiries to the virtual client were perceptive and sophisticated, the overall level of interaction between the students and the virtual client was modest. As a result, in the second trial (see below), participation points were used as a direct incentive for interaction with the client (as remarked in Section IV).

Although an example of mini-narrative was shown in the e-mail sample in Figure 5, the client memos provided a more substantial opportunity for the use of small-scale illustrative stories, to draw out or develop additional features of the case. In one memo, for example, the client says:

"... I had a problem the other day I thought you should know about. I don't know if this is something the new system can help me with. I recently acquired a large collection of movie posters at an estate sale in Indiana. I didn't have time to put them on the inventory list before leaving town again for a convention in Bangor.

Before I left, I managed to write up some notes about pricing these items. Nothing firm, you know, just some preliminary ideas.

"Well, while I was away, Babette got an inquiry from a customer who was looking for a particular poster promoting the original release of Fantasia. Not a Disney collector, really. A music historian, she said. Some guy who teaches at Columbia. This guy had seen a picture of the poster in a book on Leopold Stokowski. You know, he was the orchestra conductor in Fantasia. Well, Babette had heard about my new posters, so she and Cindy rooted around in my office and found the poster. In fact, there were four copies of it. And they found my notes on pricing the new posters and used a number I'd written down about the Fantasia posters. The customer bought all four posters.

"It probably serves me right for always telling my people, "Whatever else happens, make the sale!" The problem is, I didn't intend to price all four of these Fantasia posters the same. One was in prime condition, wrapped and rolled in a tube, and virtually untouched. One was a bit faded. Two were folded. I really needed to get each one on the inventory list separately, with its own price and a description of its condition. Of course, I don't do this with everything. I once got 250 coat buttons some guy had cut off of Disney Railroad conductor jackets that Disneyland had remaindered after they changed uniforms in 1965. The buttons were all basically identical. Not worth my effort to price them separately."³

Another mini-narrative that appeared was this one:

"Oh yeah. I said I had another problem. This also happened when I was out of town. A customer wanted to buy a hat that Hayley Mills had worn in the original version of The Parent Trap. One-of-a-kind item, of course. A real prize. Especially valuable, with that recent remake of the movie. Well, Nancy and Cindy and Matt looked high and low in the stockroom and couldn't find it. A \$450 item! It was on the inventory list. And it did turn up later. But in the meantime, they turned the customer away.

"I thought everybody understood my system in the stockroom... but we have so much more inventory than we used to. Plus, since I've been away so much lately, I think Cindy has been rearranging parts of the stockroom.

"I hit the jackpot last month - bought a huge collection of Disney items at an estate sale in Tasmania. Close to 1000 items, many of them one-of-a-kind. They're due to arrive in a couple of days. I'm worried, though. If we're having trouble finding items in our inventory now, what's it going to be like when all these new things arrive?"

In yet another memo, the client offered this tale:

"And then there was the problem we had last week. The same rare item was promised to two different customers. I was out of town, and Cindy was out sick - her husband has a bad back. Anyway, both John and Nancy each took an order for a Disney game they manufactured in 1988. Really neat item, but we only had one. Neither John nor Nancy really knows what Cindy's process is, but they know where the stockroom is. John went to the stockroom, and pulled the item for packing first. This meant Nancy had to call her customer and tell him that he wouldn't be getting the item after all. The customer was steamed. I must call him

³ Readers who have taught data modeling (or class diagramming) will recognize that this memo is designed to introduce sub-typing into the project.

and apologize. The credit card had already been charged, so she had to call the company and credit it back. I am really nervous this could happen again. I've been racking my brain trying to figure out how we could have prevented it..."

The basic objective, in writing a mini-narrative, is to create drama in the sense that the reader will witness "a plight into which characters have fallen as a result of intentions that have gone awry" [Bruner 1986: 21]. Drama and plight are illustrated, if somewhat prosaically,⁴ in the examples just given. As suggested earlier, the memos thus serve not only to introduce new complexities and to guide students' direction, but also to give students a feeling for the frequently narrative character of client representations.

SECOND TRIAL: SUPPORTING AN ENTREPRENEURIAL OPPORTUNITY

The second trial took place in two sections of an introductory database management course, involving eighteen teams of two or three individuals each. The same industry colleague once again played the virtual client. In this case, the author wrote the base scenario and the client memos, while the industry partner handled student e-mails. The project timeline was based on a series of assignments beginning with the preparation of a business case, followed by the development of a data model, a set of detailed database design specifications, and the development of a prototype database with sample interface elements. The project in this course thus adopted the general structure typical in systems analysis and design courses. The project indeed foregrounded analysis and design tasks, placing particular emphasis on business understanding, requirements analysis and logical design, and overall project process in a larger context defined by the database development lifecycle or DDLC [Watson, 2002].⁵

As in the first trial, assignments were collected from students over the course of the term, evaluated mainly on the basis of diligence-of-effort, and returned to teams with comments. The teams subsequently revised these elements and pulled them altogether, using appropriate integrative text, into a comprehensive project deliverable, a database project report.

In the main storyline, the owner of a consignment store for baby goods comes up with the idea of using the Web as the basis for a regional consortium among similar consignment stores. Members of the consortium would share inventory data in order to sharpen their acquisition of goods and to support customers seeking hard-to-find items; a pooling arrangement for customer credit earned on the sale of items is also proposed. The students' task was to design a database that would support such a cooperative undertaking. Figure 6 provides excerpts from the base scenario. Again, this scenario runs to multiple pages – although experience from the first trial prompted the creation of a sketchier base scenario in order to better stimulate students' communication with the virtual client.

As noted above, in the second trial students' interaction with the client was directly rewarded through the assignment of participation points for quality e-mails. The directions, which appeared at the bottom of the base scenario, emphasized this:

The preceding description provides insufficient details to write a good Business Case. In order to do this, you will need to contact Ginger directly with your questions about her business and her developing ideas about a system for information sharing among the consignment shops. (You will also find it necessary to contact Ginger in connection with the subsequent Project Exercises.) ...

⁴ The term "drama" is clearly used in its technical rhetorical sense here, not as in "exciting" or "suspenseful."

⁵ In short, the course in question does not focus on technical database implementation, for which the VIP would provide a less appropriate approach.

Database Management
Baby Consignment Shops Case
Opening Scenario & Contact Instructions

Introduction

Ginger owns a consignment shop in Portland that specializes in the re-sale of used baby clothes and other baby-related items. Being a consignment business, Ginger's customers are also her suppliers. That is, the items she sells in her shop are supplied by the customers. Thus, a given individual may buy from her shop, place items with the shop for sale, or both.

While she has managed to keep her shop afloat for several years now, growth is flat. Reflecting on the reasons why, Ginger has identified two basic problems with the traditional approach to this type of business. First, customers who come into her store looking for something fairly specific usually leave disappointed. This is basically a problem with selection, and it seems to be built into the business, where retailing used goods is concerned. The second problem is that customers who supply what seem to be perfectly attractive items often find that these items sit for long periods of time; too often, they simply go unpurchased altogether and either must be returned to the consigner or donated to charity. This, Ginger has reasoned, reflects the fact that the pool of customers who frequent her shop may simply be too small.

In short, both problems seem to be related to size and scope: not enough variety in the goods in her shop; and not enough customers, with wide enough needs and desires, to match up with the goods that she does have on hand.

A Bright Idea

Ginger recently talked her problems over with a faculty member from the marketing area at the local university's School of Business Administration. ... Ginger and the professor tried to think outside the box. If the problem was a matter of size and scope, but expansion was too problematic, how could Ginger proceed? ... And then the professor recognized that the relative lack of direct competition among the consignment shops was the key. "Ginger," he said, "You can get bigger without actually expanding your business. ... You do this by cooperating with the other consignment shops to share information about the available selection in each store. This way, the customer who's visiting some particular shop essentially has access to information about the stock currently in all of the shops."

Ginger thought about this for a minute. She had trouble visualizing quite how this information-sharing would be accomplished. But the idea of somehow being able to find out about the goods in other stores had lots of potential. It would be good for the shoppers, allowing them to locate what they needed. It would help her shop sell what would otherwise be slow-moving items. It could also help her avoid taking on consignment those types of items that were in oversupply in the community at large. And then she thought about her customers that placed items for sale with her shop; maybe there'd be some way for the consigners to get status information about their items on consignment from a single source, regardless of which stores they've got those items in

"Well, okay, how do we get this information-sharing going?" Ginger asked the professor...

Figure 6. Excerpts from the Base Scenario, Second Trial

Your final score on the Term Project will reflect, in part, the quality of your interaction with Ginger. I will receive copies of all e-mail messages you send her. (So, be sure you clearly identify who you are in every message.) You should be sensitive to the fact that Ginger is a very busy person – so your communications should be direct and to the point, and they should contain important questions.

Filling up Ginger's e-mail box with trivial communiqués will count against your final project score.

There were 53 e-mail exchanges between students and the virtual client, each consisting of a student message and the client's reply. The correspondents were 23 individual students representing 17 teams. Students' questions were for the most part about factual issues, and a good many of the client's replies were geared toward teaching students about what kinds of questions to ask. An example appears in Figure 7.

From:	babycons@att.net
To:	[student e-mail address removed]
Copies to:	[faculty e-mail address removed]
Subject:	Re: Questions
Date sent:	Tue, 02 Oct 2001 04:47:53 +0000

Hi ...

I was in the middle of answering your questions when my computer was accidentally switched off! So, here goes again:

...

Q4: This question is too vague, and I don't have time right now to answer it. Please break this down into more specific questions. Remember, I answer these messages at night, after a long day at the consignment store.

Q5: See my answer to Q4 above. Again, I need you to be more specific. I think the initial statement has a lot of general information in it. If you need answers to specific questions, please let me know.

- Ginger

> Dear Ginger,

> Hello. We are students majoring ISQA from [university name removed].

> We have some questions about your business. Please answer the

> following questions.

> ...

> Q4. Please explain the existing information system. (e.g., The flow

> of goods from the suppliers to the customers.) If you have any

> forms or documents for the process, please send them to us.

>

> Q5. If you have a new database system, what do you expect from it?

>

> Sincerely yours.

>

> [students' names removed]

Figure 7. Learning to Ask Questions - Excerpts from an E-mail Exchange

An important aspect of enculturating students, in a situated learning context, is learning how to converse in a domain-relevant way [Brown et al., 1989; Garvin, 1991], and these exchanges helped students to see what was "on track" versus not. Apropos enculturation, the e-mail exchanges also provided opportunities for getting students to think about the character of IS-user relations and what this implies for the conduct of communication. The exchange shown in Figure 8 was followed by another incautiously worded message from the team in question that stated, "Your responses seem adequate for our initial feasibility study." In a subsequent reply, the virtual client witheringly echoed, "I'm glad my responses are adequate for your purposes." For reinforcement, this exchange was made the point of a class discussion, in which it was noted that the person playing the virtual client had told the instructor, "If this were a real project, these guys would be history."

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From: babycons@att.net
 To: [student e-mail address removed]
 Copies to: [faculty e-mail address removed]
Subject: Re: Initial Contact and Scope Evaluation:
 Date sent: Sat, 06 Oct 2001 17:43:23 +0000

Hello,

You are not giving me much time to answer your questions. I don't usually check my e-mail on Friday night, and Saturday I'm busy at the store. However, I will try to briefly answer your questions, in between taking care of customers. In the future, please give me more time. I am a very busy person. Also, I trust that you will keep better track of your partner's activities in the future.

... [detailed answers follow]

- Ginger

> Ginger-

>

> Hello Ginger, I am [name removed] from [university name removed]
 > School of Business. My partner David and I have been selected to aid
 > you in the possible development of a distributed sales database for
 > your consignment shop. We have read over the preliminary information
 > pertaining to your case and believe there is a good chance we can
 > help you to make your project a reality.

>

> Before we begin installing servers however, we need some more
 > information about the particulars of your situation. ...

>

> If, by any chance, my partner David has already contacted you, please
 > reply to let me know, it is possible the responses you've given him
 > already may be sufficient. ...

>

> ... My partner and I would like to keep your project on track, so if
 > you could send us your reply by Saturday evening, we could get
 > started immediately afterward. We would like to have enough
 > information to compile a feasibility study by Monday morning.

>

> All our best,
 > [student names removed]

Figure 8. Learning to Ask Questions - Excerpts from Another E-mail Exchange

As in the first trial, client memos were used to extend the particulars of the case and draw students' attention to issues of interest. As anticipated, the level of student-client interaction was higher the second time around, based in part on the direct incentivizing of student communication and in part on the author's improved understanding of how better to control the amount of information furnished in the structured documents (base scenario and client memos) provided to the students. The second trial also took place in the context of a greater number of active learning exercises in the class more generally, which helped to make a higher level of student participation the norm in the class.

THIRD TRIAL: UNFAMILIAR GROUND AND DRIFTING SCOPE

The third trial, like the second, took place in two sections of an introductory database management course, involving sixteen teams of two or three individuals each. This time the author played the role of the virtual client. The project timeline again was based on the following four deliverables: a business case, a data model, a detailed database design (in the form of data-dictionary specifications), and a prototype database with sample interface elements. As before, these elements were collected as separate exercises over the course of the term, and students subsequently corrected, updated, and integrated them into the final project deliverable, the database project report.

The story, based on the author's experiences working in contract archaeology, is centered on a university cultural resources management facility, dubbed CS/CRM. Figure 9 gives the section of the base scenario that explains what kind of business "cultural resources management" is. Because students could be expected to be largely unfamiliar with this business domain, in contrast to the first two trials based on retailing operations, the base scenario provides more detailed background information. The base scenario then goes on to describe CS/CRM's data-management problems in its three main areas of operation, its information clearinghouse function, its archaeological-collections facility, and its field-projects operation. The base scenario (Figure 9) then sets the stage for the students' project work.

Database Management Archaeological Operations Case Opening Scenario & Contact Instructions

Background

Coastal State University's anthropology department runs a non-profit program in prehistoric archaeology and cultural resources management (CRM). Located in the basement of Gould Hall on the university's main campus, the CS/CRM facility performs a number of important functions. It serves as *curator* for a large number of archaeological collections. It also functions as the official *Regional Clearinghouse* for written reports and maps that document the known archaeological sites in the state. Under contract to various public agencies and private entities, CS/CRM sends teams of staff archaeologists and students into the field to conduct *surveys*, the purpose of which is to identify and assess the extent of cultural resources in locations threatened by development. CS/CRM also conducts archaeological *excavations* under contract, where these are needed in order to mitigate damage to cultural resources through scientific documentation and the recovery of physical materials. Finally, CS/CRM works with its sponsoring department to provide *training* for graduate students in archaeology.

CS/CRM's existence as a business in the public interest is based on state and federal laws relating to historic preservation and environmental impact. ...

CS/CRM competes in surveying and mitigation work with a number of private archaeologists, working as individuals or in small firms organized as limited partnerships. CS/CRM has done well in this competitive context, in part because of the inherent marketing value associated with its university affiliation, but also because of its role as the Regional Clearinghouse for archaeological information. Nearly all CRM work that needs to be done in the state ultimately requires accessing the Regional Clearinghouse, and this gives CS/CRM a degree of visibility in almost every project that gets done. CS/CRM is also highly visible because of its collections, which recently surpassed the State Museum's own collections in size. The net effect is that CS/CRM often gets work simply as the "path of least resistance": Most private parties and many governmental agencies that need archaeological work lack familiarity with this type of service and are therefore disinclined to "comparison shop." The built-in recognition also helps even when comparative bidding is involved, as is commonly the case in projects with larger agencies, like the State Department of Transportation, that contract for a lot of CRM services. These agencies rarely overlook CS/CRM in putting out invitations-to-bid, and CS/CRM is

(CONTINUED ON NEXT PAGE)

subsequently often favored in the bidding because of its low costs, which derive mainly from the use of student labor and the partial subsidy of physical facilities by the university.

CS/CRM's advantageous position in the market, however, is not a foregone conclusion. The key to CS/CRM maintaining its position depends on its image and reputation among the governmental agencies and large private parties that contract for work, as well as the entities that oversee the enforcement of historic preservation laws and policies (e.g., the State Office of Historic Preservation (SOHP), county planning commissions, etc.) CS/CRM's reputation, in fact, has suffered of late. The quality of its contracted field services continues to be very high, in part because of the close supervision provided by the anthropology department faculty. On the other hand, CS/CRM's reputation also depends on the quality of its back-office operations, especially in its clearinghouse and collections functions. And in these areas, there have been increasingly serious problems.

Doug Fredericks and his senior staff members are developing a proposal for what they call "the ArchOp System." This system would move the information used to track projects, archaeological site reports, and collections (all of which currently exists in paper form) "into the computer." The information would then be made available to CS/CRM staff members at networked PCs throughout the main facility and in the Collections building. Fredericks and his senior staff also envision eventually providing searchable catalogs of the facility's reports and collections via the Web to outside parties.

Their current hurdle, as they develop their proposal for ArchOp, is figuring out what it really means to get the information "into the computer." This is where you come in.

Figure 9. Excerpts from the Base Scenario, Third Trial

As in the base scenario for the second trial, this initial document then concludes with an overview of the analysis, design, and prototyping task that constitutes the project, plus instructions for contacting the virtual client.

The base scenario combined with initial contacts with the virtual client gave students sufficient information for preparing the business case assignment. The information necessary to get the students started on the data modeling was then rolled out in a set of client memos. Figure 10 shows excerpts from the client memo describing the projects area. These memos were posted as pages at the course website and incorporated links to various supporting documents. In the projects memo, for example, links were provided to sample reports on archaeological sites, projects, and staffing.

April 20, 2002

TO: ArchOp Consulting Teams

CC: [professor's name omitted]

FROM: Doug Fredericks, CS/CRM

RE: Detailed information: Projects

The goal of this memo is to fill you in about the projects side of our operation.

As you know, CS/CRM has two stewardship functions that serve the wider archaeological community. One involves the Collections and the other the Clearinghouse. But CS/CRM also does field projects, and here we compete with other archaeological contractors for the business. The projects, also, are the primary basis for fulfilling our educational mission of teaching our students about archaeology.

(CONTINUED ON NEXT PAGE)

Broadly speaking, we do two kinds of projects. These are archaeological surveys and mitigation projects. I think the opening scenario document you got talks about this. A survey project basically means going out and walking the ground in some locality and documenting any surface evidence of prehistoric or early-historic activity. That's lithic debitage, artifacts, midden, structural features such as pits or postholes, and the like. A mitigation project is an excavation designed to scientifically document one or more sites in an area threatened by imminent development and to recover materials for future study.

Now that I've educated you on the distinction, I'm not sure that the information we need to keep track of, relative to these two types of projects, is really all that different. I mean, they differ in some of the kinds of scientific tasks that get done. But just in terms of tracking these projects, we actually use the same form. Attached is an example.

Beyond the general project information shown in this form, there are basically four things we really need to be on top of, in managing projects. We need to keep a record of the archaeological sites being addressed by a given project. We need to track the reports produced by a project. We need to record, on the projects side of the house, when we make a submission of project materials to the Collections facility. And finally, we need to be on top of our staff assignments on projects. That's it! So this shouldn't be very complicated to do, right?

Let me give you some details. ...

Figure 10. Excerpts from the Client's Memo on the Projects Area

It became apparent shortly after the term began that the scope of the project, as laid out in the base scenario, was too ambitious for the time available. Accordingly, as the project moved toward the second deliverable (the data model), the clearinghouse portion was set aside. This change in scope was introduced as an integral part of the story, as shown in the client memo in Figure 11, which reports on a conversation between the client and one of his organization's

April 18, 2002

TO: ArchOp Consulting Teams

CC: [professor's name omitted]

FROM: Doug Fredericks, CS/CRM

RE: Detailed information: Clearinghouse

Well, I have a new development to report. I had a meeting yesterday with the chief of the State Office of Historic Preservation. I think your instructor mentions the SOHP in his "opening scenario" for your project. ... I'm telling him about the overall system project... And he red-flags the idea of having a unified database for the Clearinghouse, Collections facility, and CS/CRM's projects.

The difficulty, which is not a new issue, has to do with potential conflict of interest. Private CRM consultants have been complaining for years about the fact that we run the Clearinghouse, which is this central resource that everybody uses, but we also compete for projects. In my opinion, we'd have lost the Clearinghouse a while ago if it weren't for the fact that the university shares the costs of it with the SOHP.

So, what does this mean for our current project? We're going to have to develop a separate database for the Clearinghouse. And we're going to put that off. The SOHP has some specific requirements they want satisfied, and they're willing to kick in money. But they have to wait for next Fall's legislative session, before they'll know about funding. ...

Figure 11. A First Shift in Project Scope: Excerpts from the Clearinghouse Memo

primary stakeholders. The data modeling then proceeded based on the collections and projects functions of CS/CRM, the interaction of which specifically provided for some interesting modeling features.

The project was again downsized in moving forward into detailed design and implementation, by setting aside the collections facility. This, too, was made a part of the story (Figure 12).

MEMO
May 15, 2002

TO: ArchOp Consulting Teams
FROM: Doug Fredericks, CS/CRM
CC: [professor's name omitted]

RE: Near-term change of scope

... Dr. Ramiller and I have talked over what you should be focusing on, as you move ahead. We've had a new development here, at CSU, that has some bearing on this. The president of the university is talking about giving us some funding for software development on the Collections side of things. We're still negotiating, but it looks like one element of that would be some involvement on the part of the IT people from the university. I think we're talking mainly about symbolic participation, but until that's a bit clearer, we need to work on something else. ...

So here's what I'd like you to work on: You should focus on the project staffing side of things. Getting something going in that area will be very helpful in our efforts to improve our internal management. ...

Figure 12. A Second Shift in Scope

Properly scoping a term-project case the first time through is often problematic, and instructors get used to making adjustments during the course of the term. However, changes in scope are in fact also a very common event in real systems projects. Accordingly, deliberately working these changes into the ArchOp story represented an effort to capitalize on this valuable and practical object lesson.

In addition to scope changes, other new elements examined in this trial included the instructor playing the part of the virtual client, and the use of an unusual application area. A clear advantage of the instructor playing the client role was not having to coordinate with another person on such matters as consistency in the details and controlling the level of complexity. It also provided greater pedagogical leverage relative to the virtual client's e-mail messages. (This idea is discussed further, below.)

On the other hand, accomplishing verisimilitude called for extra diligence. Relative to client "voice" (see above), in communications as the virtual client I strived for simpler sentence structure and plainer, more colloquial phrasing than students were used to seeing in my other materials written as the instructor. In the client memos, where the need for extended explanation sometimes made simpler sentence structure more difficult, I made a point of explaining in class that I had "done a bit of editing" on the client's writing, just to "help keep things on track." Also, since the project story involved the distinct characters of both instructor and virtual client, I (as instructor) frequently referred to the client in the third person during class sessions, as I speculated about what he might be thinking on certain issues. I amplified this bit of plot-consistent misdirection with casual character observations, such as oblique references to the drinking habits of archaeologists as a possible source of delay in students getting answers to their e-mail inquiries.

As might be expected, cultural resources management was an unfamiliar business area for the students compared to the retailing situations that were the basis for the first two trials. The

unfamiliar domain had the effect of making students more dependent on the virtual client and less able to rely on their own everyday assumptions in reaching conclusions about the business. This situation is pedagogically attractive, since many students could be expected eventually to engage in analysis and design work in areas unfamiliar to them and in which their dependence on clients for domain knowledge would be extensive. An operational cost of using an unfamiliar application area in the project was that there was more work to do in explaining basics about the business.

If an unusual problem area is used in the VIP, it should offer some level of intrinsic interest for the majority of students. Archaeology seemed to qualify in this regard, as evidenced by the fact that a number of teams ventured off on the Web to dig up information on the archaeological history of the region. Unfamiliar, however, does not always imply interesting. For example, despite having personal knowledge in the area, the author would hesitate to base a VIP on the problem of tracking chemical reagents in a pharmaceutical research facility.

In addition to exploring these aspects of the VIP (drifting scope, instructor-as-client, and unusual problem domain), the third trial was again taken as an opportunity to work with mini-narratives and to focus further on student-client communication. Figure 13 shows an example of a mini-narrative drawn from the client's memo on the Collections Facility.

...
 Okay. Let me start with a story that'll give you the basic idea about our current problems in Collections. Under repatriation laws, a collections facility like ours can no longer hold human remains or funerary objects that can be linked to contemporary Native American groups. ...

Okay. So the story is that a researcher was reading about an early field project, done around 1920 by a faculty member from Berkeley. He wanted to track down the collection from that excavation. He had been doing ethnographic interviews with some of the elders from a coastal tribe, and some of their grandparents and great-grandparents had actually lived at this site, in the late 19th century, where this Berkeley excavation took place later on. His main goal was to get some of the materials that had been recovered, so he could present them to his informants for comment and discussion. But the old project report had also mentioned that some bones and grave goods were part of the collection.

Berkeley no longer had the materials, because everybody associated with the original project was long since retired and dead. You see where this is headed, right? With a series of phone calls, he was able to track the collection down to our facility. We have some very old material in Collections that we "inherited" from various university collections, when we first started up. So, the researcher shows up with the daughter and son-in-law of one of the elders. And we can't find the collection. Well, we did eventually. But we had no record of it in our tracking system. So we had to put two graduate students in the storage rooms for a couple of weeks, opening up the older boxes and looking inside. Needless to say, it was very embarrassing. Fortunately, the grave items had been removed at some point in the past. Our policy is to return a collection that has such items to the donor, but we'd have been hard-pressed to identify the responsible donor in this case, because of our laxness in handling this collection at the beginning.

...

Figure 13. The use of Micro-Narratives: Excerpt from the Collections Memo

Sixty e-mail exchanges, each consisting of an inquiry and a reply, took place between the students and the virtual client, involving 25 individual students representing all but one of the teams. Feedback on the teams' communication efforts, both positive and corrective, was provided on a team-by-team basis within the client's responses and on a broadcast basis through the posting of exemplary inquiries and focused instructor comments in class sessions. The exemplary e-mails were introduced at the website with an instructor comment that read in part:

What you might call the "art of asking good questions," in doing data-requirements analysis with business people, is something that you develop with experience over

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time. The basic challenge is in framing very specific questions that lack ambiguity, so you get the information you need, but that also don't try the patience of your user. This is sometimes easier said than done, because very specific questions will at times make you sound like you're asking about something that anyone in their right mind should already just know.

A number of the teams have put some good questions to Doug. But the following exchanges... offer particularly nice sets of focused questions. ...

Other high-quality inquiries were acknowledged by the virtual client with such phrases as "good question" and "I'm glad you asked that."

In in-class comments, meanwhile, I endeavored to draw out specific problem areas in communicating with clients that appeared in the students' e-mail exchanges with the virtual client. The following kinds of issues were noted:

- unclear phrasing
- use of technical jargon
- dealing with the client's own jargon
- vague requests
- inappropriate requests
- inadvertently provoking client concern
- the importance of taking all available resources seriously

Examples follow, drawn from the e-mail collection for this third trial.

Students often struggled simply to pose questions clearly and grammatically. In such cases, the virtual client typically responded with comments like "I'm not sure what you're looking for, exactly," "I don't understand what you mean by _____," and "I'm a little fuzzy on what this means." In a somewhat more encouraging if still puzzled vein, the client might comment along the lines of "If I understand your question ..." and "If that's what you're getting at..." In other cases, the main barrier to successful communication lay in the students' use of technical jargon. The following exchange illustrates both of these kinds of problems (in each of the examples that follows, the student team's portion is preceded by left-angled brackets):

> and last question is when designing a data model, how specific datas have
 > to be on artifacts. Do you need separate entity for all artifact items?
 > such as bones, antler and etc. Do you want us to specify every single
 > items from small to large? or just giving ID for main items is ok? For
 > example, do client want to know how many bones are collected vs speific
 > type of bone.

What's a data model? Is that what you're doing now? I'm guessing "entity" is some kind of technical term related to the data model. But I'm not sure. ...

By contrast, a few teams made a conscious effort to work around the barrier of technical jargon by explaining the terms they were using to the client. The following is a nice example:

> In the memos you described the Archaeological sites, project reports,
 > project collections how would you describe them. The Database management
 > team describes them as entities or tables but we need a word so you can
 > understand what we mean when we write up the Business Case.

That's thoughtful of you. We've used Microsoft Access for a number of things around here, so we're all comfortable with the idea of "tables" in databases.

Another example is:

- > We are working the Database Prototype and one of the question that came
- > up was regarding a validation table. A validation table is a table that
- > checks for valid entries in the fields.

Thanks for the definition. This makes sense, and it sounds like a good idea. (But every field has its lingo, doesn't it?)

The virtual client sometimes pointed out to student teams using unexplained jargon that other teams (their "competitors") had recognized this type of problem and were dealing with it:

- > Doug We are going to create a validation table for owner Category. It
- > seems like there are only a couple of possibilities for the user to enter
- > into this field. Does this seem like a good idea and what are the
- > possible entries you would like the user to enter into this field.

Well, you're the experts. But I gather from what a couple of other teams have told me that these "validation tables" will help keep errors out of the database.

Of course, in dealing with an unfamiliar application domain the students had to confront the client's own occupational jargon, as well. This provided an opportunity to point out to students that analysts need to be relatively impatient with their own ignorance and ask questions about terms they don't understand. Thus, for example, teams asking directly what a quadrangle is were given a straightforward definition. On the other hand, a team making an unexamined assumption about what "quadrangle" means earned a decidedly vexed response:

- > We have a question for you about the data collected on an archaeological
- > site. How many different USGS Quadrangles are there? Could you provide
- > a list of all the possible types?

I don't get your question. The quadrangle is a standard-sized mapping unit, used by the US Geological Survey (and others). So, the entire country is factored out into these quadrangles. (There are hundreds of them.) Each one has a unique name, so there aren't any "types." Or they're all the same type, I guess.

Client-student dialog was also an opportunity to call attention to variations and inconsistencies in language use on the business side of the organization. This, of course, is a reality that analysts commonly deal with:

- > 2. There is a little confusion on project/contract terminology. It is
- > our understanding that contract is just another term for project or vice
- > versa. Can you just confirm that? If contract is a separate thing,
- > then what kind of information would you like to keep about that?

We use the terms interchangeably around here. We have to be careful when we use these terms around the grants and contracts people, because they seem to make a big distinction between them. We don't really get it. So we just try to humor them.

The problem of students posing requests that are too general in character was noted in the discussion of the second trial. In practice, such requests typically produce nothing useful and

try the patience of the client. This problem surfaced again a few times in the third trial, for example:

- > We are now about to give you our Database Project Report. Included with
- > this, we will be doing fixes of prior submissions so everything is up to
- > date. In regards to the business case, it is important to get your
- > developed ideas about an IT-enabled solution and for us to understand
- > your operations fully. What are some ideas of areas that you
- > particularly would like addressed? Are there specific IT solutions you
- > want incorporated? At this final chance for feedback before submission
- > of the DPR, are there any previously unspecified aspects of operations
- > that we should be sure to consider?
- > ...

I'm not sure exactly what you're asking for. I guess I'm mostly just looking forward to seeing the report, and the prototype your instructor has told me you're putting together. This will probably give me some more ideas, you know, help me crystallize my thinking about what the system should eventually look like.

As for "unspecified aspects of operations," I think we've got the scope of what the system should do initially pretty well figured out. With the collections and clearinghouse, of course, there'll be additional things to think about later on.

Something new observed in the third trial were questions that asked the client to weigh in on what are properly considered internal system-design matters, for which the client could not be expected to have the necessary technical background to answer. Consider:

- > Should we keep 'Site' information in a central location in the
- > database?? In other words....you would enter site information in one
- > place and then Collection Items and/or CS/CRM Projects would be linked
- > to the necessary sites.

Well, I guess so. I don't know. That's makes the most sense, doesn't it? The archaeological site is the central thing in our business. It's what projects, collections, and the Clearinghouse all have in common. So yes. That sounds right. Doesn't it?

The phenomenon of client and IS person talking past one another is, of course, endemic to the analysis task. Another way in which this can arise is when an apparently straightforward question invokes a fear or concern on the part of the client, largely due to the client's lack of technical background. In the following situation, students probing for candidate fields for validation tables triggered an edgy inquiry from the virtual client:

- > We are sending this to inquire about all of the different current
- > positions that the staff members may be titled. The purpose of this is
- > to create restrictions on the different options that can be selected for
- > the table field of the current position of the staff members. So, can
- > you please provide us with a full list of employee position titles?

Sure thing. The position titles we currently use are director, assistant director, senior staff archaeologist, staff archaeologist, intern, and administrative assistant.

If you're going to restrict the system to these, how hard is it going to be to change it in the future?

Analysts and designers of course can't always anticipate when a seemingly innocent question will raise client anxiety like we witness here. But students need to be prepared to identify when anxiety happens and learn how to deal with it productively. This message, again, provided an opportunity for a discussion point on client-analyst communication in class session. (To its credit, the team in question got back promptly to the client with an explanation and reassurances.)

Finally, another theme to emerge from the student-client e-mails is the importance of staying on top of, and making full use of, the available resources. A number of times, students posed questions to the virtual client that could have been answered using material already on hand, like the client memos. This kind of redundancy in effort of course wastes time and energy, and can try the patience of the user. Consider the following example, in which the virtual client was nicer than he had to be (emphasis added):

- > Regarding information in the Site Summary for site function, ecological
- > zone, and owner category: are these discrete, distinct descriptions
- > that are entered? or are the descriptions more free-flowing as fits the
- > situation? For example, are there only perhaps 4 specific owner
- > categories where a box could be checked to fill in the blank?

I think I get what you're asking. This is, like, are there fixed categories? For all three of these, we do employ categories. But for site function and ecological zone, we need something more open-ended, you know, that goes beyond just a set of categories. I think the site summary form I provided with my April 20 memo shows examples. As for owner, I think we could go with a fixed set. Basically, we've got Federal, state, government-other, tribal, private-corporate, and private-noncorporate.

This exchange qualifies as a problem in client-analyst communication, because failing to heed seriously one's existing sources tends to cause the analyst to go back to the client, whose time and attention are limited. Nothing short of the analyst's credibility is at stake – an important point for students to learn. As in the second trial (Figure 8), possibly the most egregious neglect of resources was again observed to a minor degree – the problem with more than one team member separately asking the client the same questions. This duplication, too, represents a phenomenon with instructive value, as this kind of problem also tends to occur in poorly managed projects in industry.

VI. ASSESSMENT AND THE VIRTUAL INTERACTIVE PROJECT

Whenever using an unfamiliar pedagogical technique, an educator naturally wants a way to evaluate its effectiveness in meeting key learning objectives. Of course, evaluation depends in turn on having appropriate means to assess student performance in the context of the new approach. These conjoined assessment needs are no less urgent in the area of active learning strategies [Miller et al., 1996]. In this section we consider first some issues relating to assessing student performance in the VIP, and then present some preliminary reflections on the effectiveness of the VIP itself.

STUDENT ASSESSMENT

As indicated in Section V, assessment of student-team performance in the VIP was based on both:

- (1) teams' project deliverables, and
- (2) teams' interactions with the virtual client.

Interim assignments were given a small amount of point-credit and evaluated mainly on seriousness of effort, while the major report that constituted the ultimate project deliverable carried heavy point-credit and was assessed critically on thoroughness and quality. Thus, the

perceived risk was kept low during the period when learning could be expected to be intense but understanding would be modest.

Students' relative effectiveness in working with the virtual client obviously had an impact on the quality of the final deliverable and, thus, the points earned. In particular, how well the narrative elements in this work addressed the client's business problems, and how well the analytical models and design choices fit the facts of the business, depended on a team's making effective use of all the project resources, including e-mail exchanges with the client.

In the three trials, the base scenario and memos offered sufficient information so that a team severely hampered by poor communication skills (or disinclined to communicate) could nevertheless make progress in producing the deliverables. However, differences in the quality of the final work between effective and ineffective communicators were glaringly apparent. In an example from the third trial, teams with a record of inadequate client exchange produced database designs with validation tables on irrelevant fields, in some cases, or in others on relevant fields but lacking pertinent values. (The information needed for success on this aspect of the design was obtainable only from the client.) By contrast, the better communicating teams found this task straightforward.

As noted, e-mail exchanges with the virtual client were evaluated and directly awarded points. Scope of subject matter, relevance, clarity, and diligence were considered, along with indications of improvement over the course of the term. Class discussion of communication issues (see the discussion of the third trial) served to raise the salience of this aspect of the project. Scrutiny of the e-mail exchanges took place against a larger context in which class participation was emphasized heavily. This emphasis further raised the visibility of client communications as an integral dimension of the overall active-learning regime.

It is helpful to return to the ideas of narrative and drama in developing a larger perspective on the task of assessing student performance in client communications. Students are key "characters" who author their own parts in the action making up the larger narrative of the project (Figure 2). Performance assessment, then, should turn on how well a team contributed to constructing the project "drama." One aspect of this assessment is the diligence with which the team has simply "been in there pitching," working with the client at relevant points in the project lifecycle. But effectiveness is also a matter, substantively, of the team's ability to cultivate alertness and sensitivity to what can safely be presupposed both about the business client's technical knowledge, and about the students' own understanding of the business. Circumspection in the use of jargon (an issue noted in the third trial) is one surface manifestation of this larger learning challenge of making connections across the differing frames of reference held by the client, as the business representative, and the students, as the IS practitioners. This practical skill, obviously, is as important in students' professional development as their grasp of particular analysis and design techniques.

THE EFFECTIVENESS OF THE VIP

How well students performed in the trials of the VIP obviously reflects on the promise of the VIP as an approach, generally. This begs the question, then, of what student performance to date tells us about the VIP's effectiveness.

VIP is still in its early stages of development. The trials so far accordingly are exploratory in nature. As such, the conclusions I can offer are based on personal observation (including comparisons to similar classes taught with traditional written cases), and are therefore necessarily anecdotal. Future, systematic research is needed for verification. Empirical research on the effectiveness of active learning in other contexts can provide fruitful guidance. (For reviews, see Johnson and Johnson [1989] and Johnson et al. [1991].) In the meantime such research, which has broadly confirmed the value of active-learning strategies, can give us at least a degree of confidence in the efficacy of the current approach.

Informally I observed that the VIP produces a higher-level of personal engagement and interest on students' parts, as indicated by the enthusiasm shown for the project work during the term, written remarks on student course evaluations, and post-term comments made in person to the author. Also, students overall appear to offer up a greater number of astute questions around both the business case and the methodological core of the subject matter. Meanwhile, the range of quality observed in students' delivered work under the VIP is comparable to that for projects

based on traditional written cases. On average, deliverable quality appears somewhat better, although the complexity of the deliverables and their variability across cases makes comparison fairly subjective.

On the other hand, in the one area in which traditional written cases and the VIP are different by design, social processes (Figure 1), there is in some sense “no comparison,” because the VIP adds a dimension to the social interaction that is simply missing in the pure written case. Only in the VIP do students obtain the experience of communicating on issues of business problems and requirements with a client. Moreover, these communications then provide a unique and engaging platform for the active discussion, in class sessions, of important features of IS-client relationships.

Effectiveness depends upon practicality, and the question remains whether the likely costs of the VIP justify the effort entailed. (This concern is an abiding one in active learning approaches more generally, demanding careful attention to the “logistics” of time and support. [Miller et al. ,1996].) Given the limited trials to this point in time, a definitive answer cannot be had yet, but informal observations on the costs of implementing the VIP so far tend to be favorable.

The core case materials (base scenario and client memos) clearly take a significant amount of time to author. On the other hand, they appear to take no more additional time than developing a traditional written case, which many of us already do. In fact, there may be situations where the more intensive interaction with students can help in anticipating certain problems and thereby head off mis-steps (such as creating an overly complicated project, or a project that demands advanced skills not covered in class) that could lead to time-consuming backtracking and revision of project content. Once created, of course, the core materials are available for re-use, just like a traditional written case.

Reading and grading project deliverables and assisting students in learning to apply the necessary concepts, tools, and techniques remain much the same tasks under the VIP as in traditional term projects. The main area of difference in workload, then, arises with the virtual client function. The time required to handle e-mail traffic was tracked most closely during the third trial, which also witnessed the highest levels of student-client exchange. In the busiest of weeks, the virtual client spent a maximum of four hours writing replies. More typically, this task took about two hours per week, and in some weeks – at the beginning of the term, during a lull between data modeling and detailed design, and during prototype implementation at the end – it dropped effectively to zero. It is important to note that relatively small class sizes were involved (two sections, totaling 45 students). Instructors using the VIP in larger class sections can expect to see the workload on the virtual client go up, all other things being equal. Even so, this increase is unlikely to scale linearly. Many messages ask fundamentally the same questions, and the bulk of the virtual client’s time is involved in figuring out how to deal with a particular question the first time it turns up. Once a stance on a particular question is arrived at, it takes little time to answer a message about it. Even messages with rather long lists of questions can be handled efficiently. The level of detail in the client memos can also be adjusted to control the sheer volume of questions that turn up in student messages. Nevertheless, there is certain to be an upward limit on the enrollment beyond which the administration of the VIP becomes impractical. Determining what that limit is must await future trials.

VII. SUMMARY AND FUTURE DIRECTIONS

This paper considered the Virtual Interactive Project, a staging for term projects involving analysis and design that draws on research in situated learning and narrative, and that builds on familiar and readily accessible practices in IS education, including role-playing and the integrated project. As described, the approach retains the elements of control that often favor the use of written cases over field projects. However, it enriches the social-communication dimension in which written cases are deficient by introducing a virtual client with whom the students interact electronically as they carry out their work.

The trials with the VIP described here constitute early and relatively simple implementations of the approach. Many opportunities remain for exploring the possibilities of the

form and, in particular, more fully exploiting the potential for dialog and narrative.⁶ For example, rather than use just a single virtual client, an instructor might consider fielding a more complex "cast of characters" occupying different organizational roles and possibly representing conflicting perspectives, goals, and ambitions. (The case collection by Dewitz [1996] suggests some preliminary possibilities in this direction.) It might be interesting, too, to explore the imposing of a differentiated role-structure on the membership of student teams.

Meanwhile, the use of mini-narratives deserves to be more fully explored. Such storytelling presents the instructor with considerable potential for exercising creativity and imagination in enriching the business details of the case. Additional complexity can also be introduced into the larger story of the project itself. The instructor, for example, might introduce plot twists and setbacks, possibly surrounding the conflicting ambitions of participants or perhaps the caprice of external developments. (The third trial, with its scope changes, hints at the possibilities.) Time allowing, the project story could also be carried to a full climax and denouement.

To date, the students' interactions with the virtual client have been limited to e-mail and broadcast web postings. Keeping communication on a fully asynchronous basis provides a salutary measure of control, since the enforced pauses involved provide time to think about problem complexity and issues of consistency. However, this advantage comes at the cost of a lack of social cues. One step toward a richer, more dynamic student-client interaction would be to introduce the use of instant messaging. The virtual client would need to be well-prepared, so as not to inadvertently introduce inconsistencies about the business or venture into excessively complex problem development. (A measure of inconsistency and complexity, in fact, helps a case's realism. However, as noted earlier, for practical purposes in teaching, this must be kept under control.)

Having someone other than the instructor play the virtual client raises the possibility of departing from the wholly virtual format by bringing the individual into the classroom for role-playing. This would make the client more tangible for the students and obviously provide for multi-channel communication. Thorough preparation would again be crucial, and this possibility should only be entertained for an individual who can successfully stay in character with a live audience.

On another front, the VIP needs further evaluation for its scope of applicability. Its use should be explored in other kinds of courses, beyond those in the trials reported here, and more thoroughly in regular systems analysis and design courses. The VIP should be tried out in larger classes, and in classes of longer (and perhaps shorter) duration, in an effort to determine the appropriate range for its application.

In conclusion, we close by noting three broad contributions for the work on the VIP to date. The first is to call attention to the relevance of theory on situated learning for educational practice in information systems, and to highlight the potential role for narrative and dialog in accomplishing this pedagogical orientation. The second contribution lies in the work done so far to develop a systematic, reproducible program of implementation for the VIP. Finally, the third contribution has been to note that what it is to teach analysis and design reflects on what analysis and design is in real practice – an undertaking in which the formal modeling that so often occupies our attention always takes place within a larger context of human narrative and drama.

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