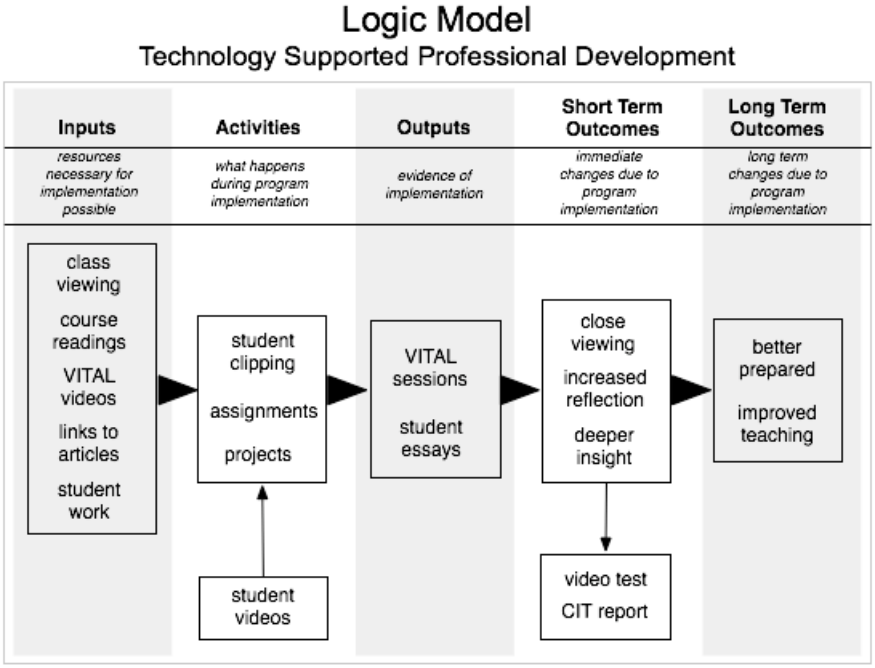
Evaluation of the VITAL Technology – C. Brunner EDC/CCT

The following logic model describes the role of the technology, VITAL, in the project. The purpose of this evaluation is to determine the effect of the technology on the learning experience of students taking the course, rather than on their learning in the area of early mathematical thinking. The purpose of this first part of the evaluation was to identify a measure to capture the role of the technology and compare it to the overall achievement of students in the course.



The resources (inputs) available in VITAL consist of facilitated viewing of video segments in class, the readings related to assignments available in VITAL, the videos, links to additional articles or books (possibly off-line) and the work done by other students.

The actual process—the activities—consists of clipping, writing assignments and creating or uploading project essays and illustrations (including videos made by students, which are part of the final project).

Outputs, or evidence that these activities have occurred, exist in the form of logs of VITAL sessions and student essays and reflections with clip links embedded.

The short term outcomes, changes that might be discernable by instructors and students in the courses, might be the degree of close viewing engaged in by students (e.g., how appropriate the clips are to the argument they are illustrating in essays), any change in the degree or nature of the reflections students share with their instructors and each other (e.g., class discussions), and any change in the depth of the students' insight into the development of early mathematical thinking.

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The long term outcomes are hypothesized to be teachers who are better prepared for teaching practice and whose teaching skills have improved as a result of their deeper understanding of the subject matter and their opportunities to conduct more in-depth virtual observations.

The evaluation of the technology itself has as its focus the extent to which students are able to demonstrate their ability to analyze video segments closely and to use the VITAL environment to enhance their own learning process.

During the previous year we experimented with a video-based subject matter test as one way to investigate students' ability to view video closely and analytically. During this year, we experimented with a self-report technique to ascertain whether students' interpretation of the way in which the VITAL environment is useful changes as they become increasingly familiar with it.

Methods:

Critical Incident Report (CIT) protocol

The *Critical Incident Technique* (CIT) is a method used to collect observations of human behavior in defined situations (Flanagan, 1954). The technique involves collecting structured, open-ended reports that typically include 1) a description of the situation 2) an account of the actions or behavior of the person involved in the incident and 3) the outcome or result. CIT has been widely used to study "what people do" in a variety of fields including industrial psychology, management, health and education (Fivars, 1980; Fivars and Fitzgerald, 2001).

In this study, the CIT method was used to collect structured data about an incident that stands out in students' minds as a critical moment of recognizing the effect of using the VITAL environment in their course. The protocol we developed asks learners to describe a recent incident during which the VITAL environment was particularly useful in helping them learn. Specifically, we asked them to describe

- the situation - what they were doing in the environment;
- the insight or information they obtained in the environment;
- the specific feature of VITAL that helped them;
- what would have been different without VITAL; and
- how important they consider the VITAL-supported insight.

The CIT was administered twice, in the middle and at the end of the course. We collected CIT reports from 57 students. We obtained two CIT reports from 33 students, of which 28 took the TC course and 5 took the Hunter course.

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We coded the 87 CIT reports according to the following scheme:

1 = *features* only, i.e., the VITAL environment made homework more efficient by allowing easy access to the material
1.5 = most of the response is about the efficiency of VITAL features but there is a generic mention of the value of the content.
2 = *content* only, i.e., the video provided students with access to "virtual" children by allowing them to observe children's thinking, served as a model of professional behavior (interviewing techniques), or enabled them to do better at their assignments by providing them with better illustrations of their points by pointing to the video clips.
2.5 = the major emphasis in the response is about the content of the videos, but there is some general mention of the way in which that content affected their understanding
3 = *process*, i.e., the students reflected on the ways in which the features of the VITAL environment affected their own learning process.

Results:

A content analysis of the responses in the CIT reports yielded the following breakdown:

CODE	ASPECT of VITAL	pre	post
1 administrative	efficiency	16	16
2 content	model of profession	9	3
2 content	virtual kids	7	5
2 content	better illustration of readings	9	4
2 content	better argument in assignments	6	12
2 content	good material	4	7
3 process	active learning process	4	11

Figure 1: Frequency of VITAL aspects mentioned in both CIT reports.

The largest number of students mentioned the efficiency features of VITAL, having all the clips available in one place, ease of integrating them into their essays, seeing all the assignments, being able to search through the library of clips and resources, etc. as being most meaningful for them in their CIT.

Among the students who focused on content rather than features, many mentioned that the clips provided them with a good model of how to interrogate kids about their thinking as professionals, both as teachers and as observers or researchers. Some focused more on the way VITAL provided them with access to "virtual kids", to seeing how kids really think and how beneficial they found it to have such good material for observation.

Some of the students whose focus was content mentioned the benefits of VITAL for their own work, both by providing them with good illustrations of the ideas described in the readings and because the availability of the clips permitted them to create better

arguments in their course assignments. There was a shift from the first to the second administration of the CIT, with an increasing focus on the value of VITAL for producing better assignments, possibly because they were dealing with their final projects at the time of the second CIT administration.

Students whose focus was on their own learning process, talked about the kind of additional information one can get from non-verbal clues (visual information), the ability to compare different children's responses in different clips dealing with similar problems, and how their own understanding of children's thinking changes as a result of multiple viewings of the same clip. There were more "process" responses during the second administration of the CIT, but since a number of those students did not participate in the administration of the first CIT, no comparison can be made.

There was some shift in the codes over the semester. Fewer students focused on purely administrative use of VITAL and more students focused on its contribution to their own learning process. The difference is significant according to a Chi-square test (10.075) at alpha = .05

CODE	pre	post
1	16	10
1.5 - 2	25	22
2.5 - 3	6	11

Figure 2: Frequency of codes in both CIT administrations.

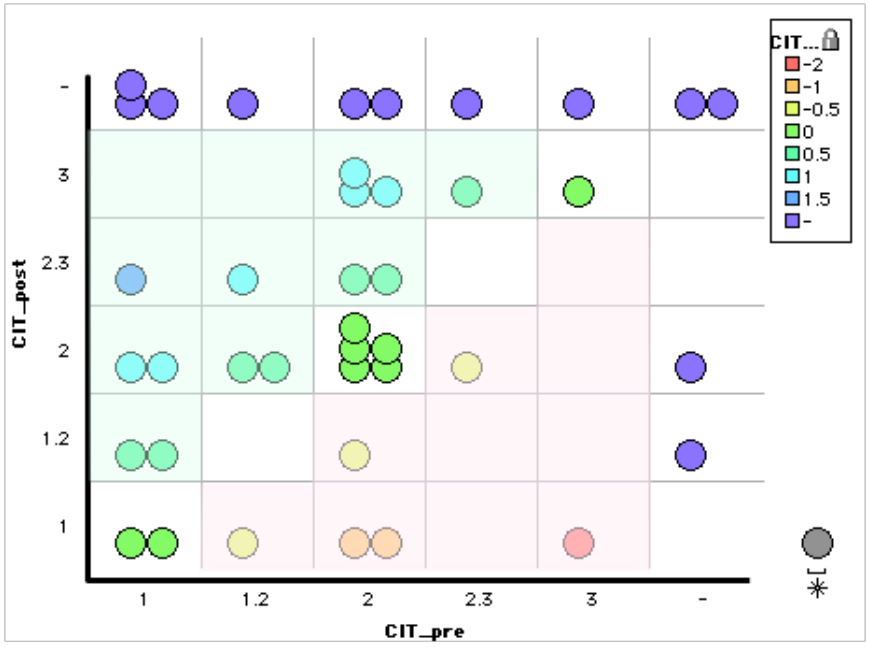


Figure 3: Distribution of codes across both administrations of the CIT, colored by amount of change.

Fourteen of the students who completed both CIT reports obtained a higher code on the second administration (green area). Eight students obtained a lower code on the second

administration (pink area), and eight students obtained the same code on both administrations or completed only one CIT (white area).

There does not appear to be a relationship between students' performance on the CIT report and the grades they received for the course as a whole, which consists of an average of grades for assignments, reflections and a final paper.

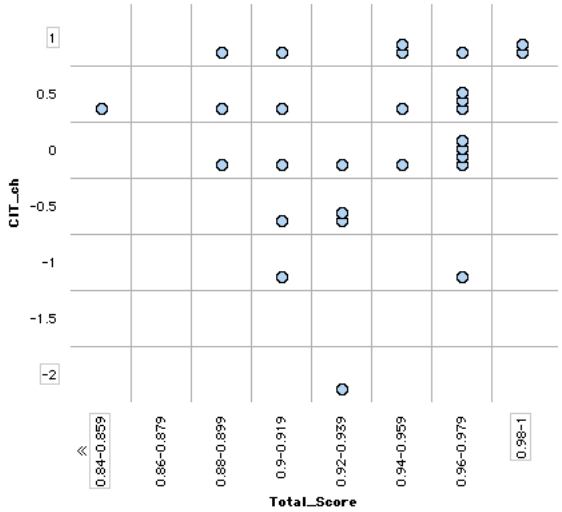
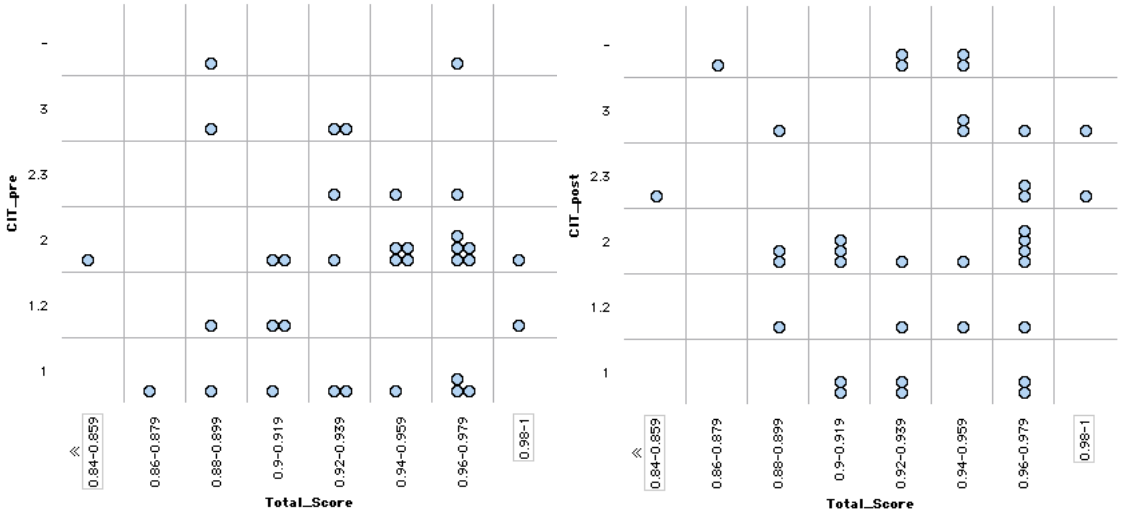


Figure 4: The relationship between the degree of change in CT codes and final grades for the course.



Figures 5 and 6: The relationship between codes on the first CIT report (fig. 5) and the second CIT report (fig. 6) and the final grades for the course.

Figure 4 appears to show a relationship in that the preponderance of students who obtained an increase in CIT codes also seem to have done better in the course overall, but it is not bore out by more systematic analysis. Examination of the relationship between CIT codes and final grade for each administration (figs. 5 and 6) shows that there are as

many students who obtained low CIT codes but did very well on the course as there are students who obtained higher CIT codes but did not do as well on the course as a whole.

Implications:

The finding is very tentative because the sample is so small. If it holds in the larger sample, it implies that the CIT really asks students to think about a very different topic than the course itself. It is the only instance where students are asked to reflect directly on the relationship between the technology and the substance of the course. We asked them to reflect on the benefits of the technology because that is the focus of this evaluation. The empirical question we can consider next semester, when we have more data, is: whether students who become increasingly aware of the benefits of the technology not only for administrative purposes and for the content of the video material, but also because engagement with it can positively affect their own learning process, also become more thoughtful about early mathematical thinking in children. At this point, there is very little basis for linking "learning" in the course with learning about the affordances of technology. The larger study will have to show whether the use of the technology leads to a better understanding of the content of the course. A comparison group is needed.

During the next semester, we will include a CIT that asks students to describe a critical moment when VITAL helped them see something they hadn't noticed before. This is a more specific use of the technique, focusing students on the use of VITAL for their own learning process rather than asking them in a more general way how they found the environment helpful. We will ask students to describe a moment when repeated viewings of the same clip lead them to a deeper understanding or different interpretation of the "virtual" child's mathematical thinking and to specify what the initial understanding was and how watching the clip repeatedly changed it. This exercise can be part of a course assignment or be administered on its own. It cannot be administered twice, because there is little chance of such an incident occurring to most students very early in the course, but it can be the second CIT at the end of the course, while the early CIT asks them to describe a more general moment when the VITAL environment was helpful to them.

(Fivers, G. (1980). The critical incident technique: A bibliography. Palo Alto: American Institutes for Research.
Fivers, G and Fitzgerald, P. (2001). The critical incident technique bibliography. Retrieved August 2, 2006, from www.apa.org/psycinfo/special/cit-full.pdf
Flanagan, J.C. (1954). The critical incident technique. *Psychological Bulletin,51, 327-58*.)