THE CASE STUDY IN EDUCATIONAL TECHNOLOGY

Objectives

1. Summarize in your own words the idea how the term “case study” is both a type of research, and a format for conducting other types of research.
2. List the general aims of the case study method
3. Identify sources of case study research on the Web
4. Distinguish between a "qualitative case study" and a "quantitative case study"
5. Describe the identifying characteristics of qualitative and quantitative web-based case studies
6. Demonstrate the procedure for conducting qualitative and quantitative web-based case studies.

Introduction

Case study is at once a type of research, and a format of conducting research. Ethnographic research for example, might use a case study format. Ethnographic research is described in this book as virtual ethnography. Action research might also use the case study format for conducting research, which is also discussed in this book.

Finding a Purpose

Illustrative Case Studies

Illustrative Case Studies are descriptive; they utilize one or two instances to show what a situation is like. This helps interpret other data, especially when there is reason to believe that readers know too little about a program. These case studies serve to make the unfamiliar familiar, and give readers a common language about the topic. The chosen site or website should be typical of important variations, and contain a small number of cases to sustain reader's interest. There are pitfalls in presenting illustrative case studies. They require presentation of in-depth information on each illustration; there may not be time on-site for in-depth examination. The most serious problem is with the selection of instances. The case(s) must adequately represent the situation or program. Where significant diversity exists, it may not be possible to select a typical site or website.

Exploratory Case Studies

Exploratory Case Studies are condensed case studies, undertaken before implementing a large-scale investigation. Where considerable uncertainty exists about
program operations, goals, and results, exploratory case studies help identify questions, select measurement constructs, and develop measures; they also serve to safeguard investment in larger studies. The greatest pitfall in the exploratory study is premature findings may seem convincing enough to be released inappropriately as conclusions. Other pitfalls include the tendency to extend the exploratory phase, and inadequate representations of diversity.

**Critical Instance Case Studies**

Critical Instance Case Studies examine one or a few sites for one of two purposes. A very frequent application is the examination of a situation of unique interest, with little or no interest in generalizability. A second, less common application entails a highly generalized or universal assertion that is called into question, and we can test it by examining one instance. This method is particularly suited for answering cause-and-effect questions about the instance of concern. The most serious pitfall in this application is inadequate specification of the evaluation question. The importance of probing the underlying concerns in a request is crucial to the appropriate application of the critical instance case study.

**Program Implementation Case Studies**

Program Implementation Case Studies help discern whether implementation is in compliance with its intent. These case studies are also useful when concern exists about implementation problems. Extensive, longitudinal reports of what has happened over time can set a context for interpreting a finding of implementation variability. In either case, generalization is wanted and the evaluation questions must be carefully negotiated with the customer. A requirement for good program implementation case studies is investment of sufficient time to obtain longitudinal data and breadth of information. Multiple sites are typically required to answer program implementation questions; this imposes demands on training and supervision needed for quality control. The demands of data management, quality control, validation procedures, and analytic model (within site, cross site, etc.) may lead to cutting too many corners to maintain quality.

**Program Effects Case Studies**

Program Effects Case Studies can determine the impact of programs and provide inference about reasons for success or failure. Like the program implementation case study, the evaluation questions usually require generalizability and, for a highly diverse program, it may be difficult to answer the questions adequately and retain a manageable number of sites. There are methodological solutions to this problem. One is to first conduct the case studies in sites chosen for their representativeness, and then verify these findings through examination of administrative data, prior reports, or a survey. Another solution is to use other methods first. After identifying findings of specific interest, case studies could then be implemented in selected sites to maximize the usefulness of the information.
Cumulative Case Studies

Cumulative Case Studies aggregate information from several sites collected at different times. The cumulative case study can be retrospective, collecting information across studies done in the past, or prospective, structuring a series of investigations for different times in the future. Retrospective cumulation allows generalization without cost and time of conducting numerous new case studies; prospective cumulation also allows generalization without unmanageably large numbers of cases in process at any one time. The techniques for ensuring sufficient comparability and quality and for aggregating the information are what constitute the "cumulative" part of the methodology. Two features of the cumulative case study are the case survey method, used as a means of aggregating findings, and backfill techniques. The latter are helpful in retrospective cumulation as a means of obtaining information from authors that permits use otherwise insufficiently detailed case studies. Opinions vary as to the credibility of cumulative case studies for answering program implementation and effects questions. One authority notes that publication biases may favor programs that seem to work, which could lead to a misleading positive view (Berger, 1983). Others are concerned about problems in verifying the quality of the original data and analyses (Yin, 1989).

Investigating a Phenomenon

Most notable educational research experts prefer to classify “case study research” as the qualitative investigation of a phenomenon (Gall, Gall & Borg, 2003; Mertler & Charles, 2005). These books offer important advice that is true of web-based research as well, namely that you’ll have one of three reasons for using case study research:

1) **To get a vivid description.** In a case study whose primary aim is description, your research will attempt to depict a typical occurrence or re-occurring phenomenon and conceptualize it in a “thick description” (Gall et al, 2003, p. 439). In creating the thick descriptions look for constructs that bring some order to your description and relate it to findings reported in previous studies. Since most web-based educational research still deals with unseen learners working on at a distance, your “constructs” can be either intact concept inferred from observed data, or partially developed ideas – from initial impressions gained from knowledge of the publication of autonomous processes. Patterns or themes should be encouraged to emerge from the data.

2) **To get an explanation.** Sometimes finding a pattern or theme within the data is the primary aim of your research. Some case study research aims primarily to provide explanations.

3) **To evaluate.** Sometimes a case study is needed to render a judgment of series of judgments about something.

Again, technology like online survey tools and Explorer Centres can help you collect these text and verbal data generated by students, and technology adoption models
like phase theory, can help you to classify their adoption. Consult the chapter on discourse analysis for details.

**Getting Started**

As a type of research, new researchers of Web-based teaching and learning will first want to characterize their case study in accordance with Stake’s typology of case study research, to define the size and general aims of their case study, particularly if it is qualitative case study research (Stake, 1994, 1995):

- **Intrinsic case study** (where the focus is on understanding the particulars of the case).
- **Instrumental case study** (where the aim is to understanding something more general than the case).
- **Collective case study** (where interest is in studying and comparing multiple cases in a single research study).

Jensen and Rodgers (2001) extended Stake’s list into a systematic classification of case studies:

- **Snapshot case study.** Detailed, objective study of one research entity at one point in time. Hypothesis-testing by comparing patterns across sub-entities (e.g., comparing departments within the case study agency).
- **Longitudinal case study.** Quantitative and/or qualitative study of one research entity at multiple time points.
- **Pre-post case study.** Study of one research entity at two time points separated by a critical event. A critical event is one that on the basis of a theory under study would be expected to impact case observations significantly.
- **Patchwork case study.** A set of multiple case studies of the same research entity, using snapshot, longitudinal, and/or pre-post designs. This multi-design approach is intended to provide a more holistic view of the dynamics of the research subject.
- **Comparative case study.** A set of multiple case studies of multiple research entities for the purpose of cross-unit comparison. Both qualitative and quantitative comparisons are generally made.

**Sources of Evidence**

Student-researchers of Web-based teaching and learning will want to know where to find data for their case study research. Fortunately, Stake (1995) and Yin (1994) has both identified at least six sources of evidence that have been adapted here to Web-based case study research.

**Original Documentation**
Documents could be threaded student discussions downloaded for analysis, or petitions from students, student products such as essays or projects, or online learning resources, or any document that is germane to the investigation. The documents should serve to corroborate the evidence from other sources. Documents are also useful for making inferences about events. Documents can lead to false leads, in the hands of inexperienced researchers, which has been a criticism of case study research.

Archival Data

Archival documents can be student grades, records obtained from previous online courses, survey data, and other records.

Interview Data

Interviews are one of the most important sources of case study information. Interviews can be conducted offline in someone’s office, or online in a chat room or blog. This technique is often used to confirm data collected from another source. In Web-based educational research, most interview studies focus on best practice of Web course management. New researchers should seek the same data from other sources to verify its authenticity. An interview can take one of several formats:

- **Open-ended.** In an open-ended interview, key respondents are asked to comment about certain events. They may propose solutions or provide insight into events. They may also corroborate evidence obtained from other sources.
- **Focused.** The focused interview is used in a situation where the respondent is interviewed for a short period of time, usually answering set questions.
- **Structured.** The structured interview is similar to a survey, and is used to gather data in cases such as neighbourhood studies. The questions are detailed and developed in advance, much as they are in a survey.
- **Survey.** A survey is a method of gathering information from a sample of individuals. This "sample" is usually just a fraction of the population being studied. Unlike a census, where all members of the population are studied, surveys gather information from only a portion of a population of interest, namely the size of the sample, depending on the purpose of the study. When conducted properly your sample will not be selected haphazardly or only from persons who volunteer to participate, but randomly so that each person in the population has a chance of selection. This way, the results can be reliably projected from the sample to the larger population. Mail surveys can be relatively low in cost, and are most effective when directed at particular groups, such as teachers in a professional association. Telephone interviews are good in situations where timeliness is a factor and the length of the survey is limited. In-person interviews in an office are a good idea when complex information must be collected. Internet surveys that run in a web browser or email client has become an efficient alternative, albeit annoying to some people when unannounced.

Direct Observation Data
In Web-based educational research, direct observation is usually conducted on methods of Web-based teaching and learning. Direct observation occurs when a field visit is conducted during the case study. It could be as simple as casual data collection activities, or formal protocols to measure and record behaviours. This technique is useful for providing additional information about the topic being studied. The reliability is enhanced when more than one observer is involved in the task.

**Participant-Observer Impressions**

Participant-observation makes the researcher into an active participant in the events being studied. This often occurs in web course studies wherein the teacher becomes the researcher. The technique provides some unusual opportunities for collecting data, but could face some major problems as well. You could well alter the course of events as part of the class, which may not be helpful to the study. Before drawing conclusions about data collected from a participant-observation case study, it’s a good idea to retain an independent rater, or engage peer assessors. For more discussion of Web-based peer assessment, read about the post and vote model of Web-based peer assessment in the chapter "Action Research with Communications Web Tools".

**Physical Artifacts**

Physical artifacts can be a web tool, agent, data-collection instrument, or other physical evidence that may be collected during the study as part of a field visit. For further discussion of "instructional artifacts", “instructional devices”, “learning objects” and "learning resources", refer to the chapter on "Action Research with Database Web Tools".

It is important to keep in mind that not all sources are relevant for all case studies (Yin, 1994). The investigator should be capable of dealing with all of them, should it be necessary, but each case will present different opportunities for data collection. There are some conditions that arise when a case researcher must start data collection before the study questions have been defined and finalized (Yin, 1994). This is likely to be successful only with an experienced investigator. Another important point to review is the benefit of using rival hypotheses and theories as a means of adding quality control to the case study. This improves the perception of the fairness and serious thinking of the researcher.

**Case Study Thesis Research**

**The Virtual University**

Carol Wilson completed her Ed.D. thesis at the University of Louisville on the topic of "Faculty issues and attitudes about distance learning: A case study of the Kentucky Virtual University". The research problem was that the professoriate at the Kentucky Virtual University might be unwilling and unprepared to offer distance learning (DL), unrewarded for their efforts, and unsupported by the university infrastructure. A case study was conducted to investigate four phenomena regarding
distance learning in Kentucky's higher education system: (a) the policy context for DL; (b) attitudes about faculty DL issues; (c) faculty proficiency in instructional technology skills; and (d) institutional barriers and support for DL. Data were obtained from three sources: mining of documents, a faculty development needs assessment survey distributed to 1500 faculty members at the nine Kentucky institutions of higher education, and interviews conducted with more than sixty administrators and faculty members.

This study found that the Kentucky faculty were: (a) intrinsically motivated to use instructional technology to improve student learning; (b) unsure of the instructional efficacy of DL; (c) unconvinced about personal involvement in DL; (d) under time pressure; (e) prepared in most of the ISTE technology performance standards for teachers; (f) under-prepared in areas related to online instruction; (g) unrewarded for their work with instructional technology; and (h) feeling under-supported by the university infrastructure.

The Case of E-Learning at a Public College

Abed-Elslame Almala completed doctoral thesis the D.Aed degree at George Mason University entitled "Planning for high quality e-learning in institutions of higher education: An analytical case study of a two-year public community college in Virginia". This dissertation assessed and evaluated the quality of e-learning in institutions of higher education, and comprehensively examines the implementation stages of this learning process at the Extended Learning Institute of Northern Virginia Community College. E-learning students, faculty, technical support staff and administrators at the Extended Learning Institute (ELI) were surveyed to obtain their perceptions on the quality of e-learning. Administrators were also interviewed on the process of designing, developing and implementing e-learning courses. In addition, a sample of six e-learning classes was evaluated using Khan's (2001) Web-Based Learning Framework (WBL). The responses to these research instruments were used to determine the ELI's e-learning level of quality. The study participants' perceptions, the course evaluation process, and interviews with administrators indicated that the quality of e-learning at the ELI could be improved. Recommendations for enhancing e-learning focus on issues such as upgrading from Blackboard Academic Suite 5 to 6 for its new features such as the content, assessment and collaboration systems, enhancing e-learning courses' development process, diversifying the Web-based e-learning delivery system, providing training for students, improving course structure, providing students and faculty with effective support systems, and using course evaluation data to periodically assess these courses' quality. Responding to these recommendations positively, comprehensively, and in a timely manner would increase the quality of e-learning courses at the ELI and other institutions of higher education.

The Case of a Self-Initiated Technology-Inspired Intervention

In 2004 Donna DeGennaro completed a Ph.D thesis at University of Pennsylvania on "Examining technology fluency: A window into and a reflection of evolving instructor schemas and practices". The usual route for this kind of project would be to conduct a formative evaluation of the intervention. I like to think (perhaps optimistically) that most instructors routinely conduct formative evaluations of their own Web-based course
materials. In this instance, the decision to conduct a case study instead may have been that the intervention either had a short shelf-life (the intervention leaves with its inventor), or perhaps there were unforeseen organizational policy decisions. Specifically, the intervention merged privileged students from a private suburban high school (instructors) with inner-city youth from an impoverished neighborhood (learners) to participate in a web-design course. The question for this research asks how do technology-experienced instructors bridge local understandings of technology learning to successfully engage technology-novice learners? Using a theoretical framework from cultural sociology, this study draws attention to the transformation of instructor schemas and practices as instructors interact with learners throughout the course. The methodology uses design research to examine observation, video, field note and email data. Design research assists in making visible component parts of the environment so that designers can proactively respond to changes that occur during implementation. The intention is not only to illuminate the what and how of change, but also offer explanations as to why.

This dissertation made three arguments. First, the relationship between instructor schemas and practices contribute to the structure of the classroom. Next, the ensuing learning environment structure gives way to particular teacher-learner and learner-learner interactions. Finally, the microanalysis of instructor-learner interactions suggests different kinds of individual instructor change. As a result, this research proposes design principles that assist in providing participants with experience in becoming active contributors to practice in technology fluency learning environments. Study of changing schemas and practices during designed program activities bring to light the relationship between theory and practice.

A Qualitative, Single Case Study With Very Small Numbers

Deborah Tiwari completed a PhD in 2002 with a thesis "Factors affecting collaboration among learners in a Web-based learning (WBL) environment". This qualitative single case study was comprised of a WBL course delivered to a group of public sector employees in various locations around the world, and focused on their WBL experiences. An instructor, a course administrator, a Website manager, and eight learners volunteered to participate in the case study. Limited research has been undertaken in exploring the factors that affect learners and instructors in WBL. How WBL learners co-construct knowledge through collaboration with each other under the guidance of an instructor has not been examined in-depth. Although there is literature that examines general factors affecting learners in the WBL environment, there is little research that reveals why these factors are significant to the process of constructing learning, or how they impact learners' ability to collaborate in a WBL environment. Data from the study were analyzed in order to provide in-depth descriptions of factors affecting collaboration among learners in a course delivered solely through WBL. This study revealed factors that primarily prevented learners from collaborating among themselves as they constructed their learning in a Web-based environment. Some factors that could have facilitated collaboration were evident; however, the barriers to it were insurmountable in this case.

The findings of this study have illuminated findings of previous studies, and contributed new understandings. Recommendations for WBL processes and components
will assist WBL instructors and designers to facilitate collaboration and knowledge co-construction among learners.

**Nine Short Case Studies**

T. McConlogue completed a Ph.D. at the University of Sheffield in 2003 with a thesis entitled "An investigation into the educational beliefs and knowledge of distance education online tutors". The aim of this study was to investigate the educational beliefs and knowledge that distance education tutors held about their online practice. This study drew on the literature and research on teachers' beliefs, distance education and online teaching. There is an extensive body of literature on pre-college teachers' beliefs, and on academic lecturers' conceptions of teaching. However, there is little research into the beliefs of online tutors and distance education tutors. There seems, therefore, to be a gap in the literature. This study followed a constructivist research paradigm. There were 9 participants, all tutors from Schools of Education in the UK. The methods used were interviews, stimulated recall, an audio diary and an autobiography. The data was coded and 9 short case studies were written.

Three main discoveries were made. Firstly, in contrast to Kember's model, tutors would not fit easily into specific orientations: Most tutors were capable of adopting both facilitative and expert roles. Secondly, two distinct approaches to online interaction: tutors were distinguishable, either would either replicate elements of their f2f practice online, or they changed their practice so that, for example, where they would chat with students f2f, they avoided online chat. Thirdly, Laurillard's conversational framework did not seem to fit the many-to-many interaction described by some of the online tutors. Hence an alternative framework was proposed to fit their description of their practice. Recommendations were made for further research in each of these areas.

**Classifying Web-Course Attitudes By Theoretical Framework**

In 2003 Mary Bucy completed a Ph.D thesis at Oregon State University entitled "Online classes: The student experience". This qualitative study explored student perceptions of their online class experience using expectancy-value theory as a framework in an attempt to gain a better understanding of the criteria for designing an effective on-line course. The purpose of this case study was to describe the experience of students enrolled in online courses at two western universities in order to answer the following questions: (1) What do students value in terms of an outcome? (2) What do students value in terms of an online experience? (3) What do students consider to be negative factors (costs) in terms of an online experience? Data were collected using a variety of techniques. Twenty students in two online classes at one university participated in focus groups. Ten students from two universities participated in open-ended interviews, conducted either face-to-face or via telephone. Fifteen students, including those who were interviewed, maintained anecdotal records to capture real-time reactions to the experience. Participants represented a variety of disciplines, ages, and backgrounds. Transcripts from interviews and focus groups were pooled with information from anecdotal records and entered into QSR Nud*ist (qualitative analysis software) for coding. Categories represented in the data include orientation, course content, student-student interaction, student-teacher interaction, course interface and navigation, flexibility, hardware/software issues, and support systems.
Students described both positive and negative factors in each of these categories. Negative factors identified by participants closely matched factors identified in cognitive load theory as extraneous cognitive load, suggesting that reducing negative factors in online courses may also reduce cognitive load, leading to improved learning. Additionally, findings from this study suggest that it may be possible to increase student motivation to participate and persist in online courses by adjusting the course design to enhance positive factors identified by participants and minimize factors they identified as negative.

**Procedure for Conducting an Online Case Study**

- Write the context of the situation and background to the need or problem
- Add a statement about the current issues, sub-problems and questions accounting for the DECL factors
- Through your university library, explore the extant books, periodicals, in print and online databases, and sketch-out a literature review
- Throughoutly describe the learning culture, in DECL terms, especially the Environmental Setting
- Explain the technical and educational issues in the management of the online course(s)
- **Method**
  - Describe the participants (learners in DECL terms)
  - Describe all the researchers (yourself and anyone else involved)
  - Describe how the online course management software has been structured and presented to students, using Mayer’s multimedia learning principles (e.g., redundancy, modality, spatial contiguity, etc)
  - Describe your case study design, using this chapter and other sources as a guide.
  - Describe your procedures in as much detail as possible.
- Describe your results separately here. Try to keep things. Keep separate, for example: the discourse analysis of discussion board postings, telephone survey data, respondents to the questionnaire, and so on.
- In a separate discussion section, summarize in your own words what the data is telling you. Here’s the place to bring together the impressions from your different data sources. Reflect back on the context of the situation and the background to the need or problem.
- List your references in APA or similar conventional academic format.

The case study format of conducting research can be supported by off-the-shelf web tools that permit the publication of autonomous processes. The automated quantitative data output (e.g., time-logs in/out, page hits, number of postings, and so on) can be put to use in your case study. These data can be segmented, classified and reported as evidence of initial learning activity, albeit unqualified initial learning activity. To gain a better picture of web-based educational activity, you’ll want to augment these numbers with the collection and analysis of qualitative data, such as discourse analysis of text generated by students in a chat room or bulletin board, or more recently, spoken discussions presented and captured in Internet-based two-way audio conferences that don’t use a browser.
References


