USING CASE-STUDY ANALYSIS IN TECHNOLOGY EDUCATION RESEARCH

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Abstract

Case-study analysis is an appropriate choice for educational researchers who investigate a topic in depth. There are a number of recent examples of the application of case-study models in Canadian and European research of technology and industrial education, but far fewer from the U.S. This paper provides researchers with information useful in identifying problems suitable for case-study research, conducting methodological literature reviews, and employing the methodologies associated with case-study analysis. Two types of sources were consulted to identify the theory and application of case-study analysis for technology education: the recent methodological literature, and recent ethnographic studies which used case-study models. Such models were found to be appropriate to answer unresolved questions in technology education research. The paper concludes with recommendations for the application of case-study models to such research questions.

Introduction

Case-study analysis is often an appropriate choice for technology and industrial-education researchers who seek to investigate a topic in depth. In addition, such models may be well-suited to answering many questions recognized by the field as requiring further research.

The goal of this paper is to provide researchers with information useful in identifying problems suitable for case-study research, conducting methodological literature reviews, and employing the methodologies associated with case-study analysis. The paper concludes with recommendations for the application of case-study models to such research questions.

Background

Case-study analysis is one means researchers have for testing research questions. In technology and industrial education, the most typical procedure is for the researcher to visit a site many times, conducting observations and interviews, which are recorded by hand or mechanically on

audio- or videotape. The data from these visits are then analyzed and synthesized in response to the research questions. A straightforward example is Evanciew and Rojewski's (1999) skill-and-knowledge acquisition study.

Although they had several specific research questions, the overarching goal of Evanciew and Rojewski's research was to "explore, examine, and describe…interactions that occurred between mentors and apprentices" in youth work programs (p. 26). The researchers selected a case-study model because it allowed them to actually "see and understand the types of interactions…between mentors and apprentices in workplace settings" (p. 28).

Case-study research was an appropriate choice for Evanciew and Rojewski's study—as well as for several other recent industrial-education studies—not only because these studies seek to investigate a topic in depth, but also because they investigate an area in which little prior research has been done; thus, they are exploratory. Case-study models are often appropriate in exploratory research because such research necessarily has ill-defined research questions.

There are several good examples of the application of case-study models in Canadian and European research of technology and industrial education. Dhillon and Moreland (1996) investigated competency-based teacher in-servicing; Hansen (1998) studied the socialization experiences of two technology teachers; and Twyford and Järvinen (2000) studied how children form technological concepts (see also Järvinen & Hiltunen, 2000). In a rare example of a personal experience case-study, Braundy (2000) used first-person language to describe the struggles of a woman in a male-dominated field.

There are fewer examples from the U.S. (e.g., Evanciew & Rojewski, 1999; Foster & Wright, 2001), although the attitude of U.S. journal editors seems to be favorable to qualitative research in general (Lewis, 1999; Custer, 1997; Hoepfl, 1997) and despite their publication of case-study research from abroad. Only a few researchers have expressed concern that too little experimental research is reported in technology-education journals (Haynie, 1998; cf. Petrina, 1998).

Appropriateness of Case Studies in Technology Education

> We in technology education must employ the paradigm that can best answer the questions we wish to have answered. If we stick to tried and true paradigms, the consequence is that certain key kinds of questions will not be asked or answered. (Lewis, 1999, p. 52).

Hoepfl (1997) cites reports by Karen Zuga and Scott Johnson, two of the best-known researchers in the field, calling for the increased use of qualitative methods. Several other influential writers in the field (e.g. Lewis, 1999; Petrina, 1998) have agreed with this assessment.

In proposing a research agenda for technology education, Foster (1996) noted that "rhetoric abounds, but what is needed now is hard data" (p. 33). An article by Jackson (1996), a first-grade teacher, illustrates this point relative to technology education. From her own experience as a classroom teacher, she asserts that "the instructor does not have to be mechanically inclined to achieve success" in technology education (p. 11). Although this assertion falls on the "rhetoric" side of Foster's rhetoric–hard-data dichotomy, it is nonetheless valuable information, as it relates the practical experience of a teacher. Yet it is not research-based data. As Zuga (1996) wrote, few claims made for technology education have been substantiated with structured research.

Krathwohl (1993) identified several types of educational problems appropriately addressed via qualitative methods. At the top of this list are problems where "research is lacking in an area and must emphasize discovery rather than validation or confirmation" (p. 352). Krathwohl also suggested these characteristics of problems suitable for qualitative analysis: a "well-grounded explanation of a phenomenon" is desired; "the focus of the study is on a process…more than on a product;" and "side effects or unexpected consequences may be important" (p. 352-353). See Hoepfl (1997) for a primer on qualitative methods in technology education research.

The implication of comments made by those who have observed trends in recent technology education literature is that (a) the field lacks foundational research in many areas (e.g., Foster, 1996), and that (b) much of the available research may be "methodologically flawed" (Johnson, 1993, p. 29). Custer (1997) has noted an increase in the use of non-quantitative methods in industrial education in general.

In fact, a reasonable argument could be made that given the dearth of foundational research in technology education, nearly all research in the field could be regarded as exploratory—and that therefore qualitative methods may be appropriate for many areas of technology education research.

Theory of Case Study Analysis

For the purposes of this paper, *qualitative* research methods yield data that cannot be manipulated mathematically; they are thus differentiated from *quantitative* methods. *Ethnographic* research attempts to explain the interrelationships of individuals, groups, and phenomena. It almost always relies on several methods, which are usually qualitative. Thus ethnography and qualitative methods are often treated simultaneously in the literature (e.g., Charles & Mertler, 2002; c.f. Badke, 2000, who devotes a chapter to case studies). Case-study research often uses ethnographic methods (Stake, 1994, 1998).

Ethnography and Qualitative Methods

Regarding ethnographic research methods, Cole (1991) noted that "methods associated mainly with the field of anthropology are gaining in popularity and use in the educational research community" (p. 185). Despite this popularity, ethnographic methods in education "have not become the predominant mode of educational inquiry" (Goodson & Magan, 1991, p. 25). Some of the reasons for this are external, such as funding problems and the popularity of increasing complex quantitative designs. Another problem is that interpretations of ethnographic data are largely subjective (Peshkin, 2000).

In technology education, the argument for ethnography and other qualitative research has often been that quantitative or descriptive studies are insufficient for the questions the field needs to have answered (Zuga, 1997; Lewis, 1999; Petrina, 1998).

The purpose conducting a case study, Stake (1998) wrote, is to learn as much as possible from that case, not to generalize beyond that case. Mitchell (1984) defined case study analysis as "the detailed presentation of ethnographic data relating to some sequence of events from which the analyst seeks to make some theoretical significance" (p. 237); "As a form of research," Stake suggested, "case study is defined by interest in individual cases, not by the methods of inquiry used" (p. 86).

Disadvantages of Case-Studies. While case study models can provide rich and meaningful data not easily yielded by other means, they bring with them several disadvantages. Except in unusual circumstances, findings from case studies are not generalizable to a larger population (Stake, 1998). Even when this is recognized, Stake noted, the power of a case study can be blunted if too much attention is placed on generalization or the generation of an overarching theory. Case-study analysis also is susceptible to the same reliability and validity pitfalls of all qualitative research.

Ensuring Quality

> Most writers share a common concern with accuracy and so seek to gauge how close measures come to reflecting the true state of affairs. Yet different writers use terms like agreement, reliability, and validity and mean quite different things by them… (Bakeman, 2000, p. 149).

Notions of reliability and validity in case-study research are difficult to conceptualize, much less quantify. As Jansen and Peshkin (1992) put it, "those in qualitative research who have become comfortable with subjectivity…are reconciled to phenomena that they perceive, interpret, and construct and that they take as ambiguous, protean, and complex" (p. 717). When a methodological decision must be made in studying a case site, Stake (1994) said, "each researcher will make up his or her own mind" (p. 238)—unlike the experimental researcher whose decisions may be standardized.

Validity. In general research, "validity is the term most used to judge the quality or merit of a particular study" (Gliner & Morgan, 2000, p. 82). Before the 1980s, "valid research was distinguished from invalid research in terms of the extent to which the proper procedures were properly applied" (Smith, 1990, p. 168-169). This empirical view is slowly being replaced by a view that good methodology alone will not guarantee quality research. Guba and Lincoln (1998) have identified three prevailing conceptions of how the "goodness or quality" (p. 213) of a study should be evaluated: postpositivism, or the use of "conventional benchmarks of rigor;" constructivism, which focuses on "trustworthiness" and "authenticity;" and critical theory, which is to be judged by the "extent to which it provides a stimulus to action" (p. 213-214). Seale (1999) describes several perspectives on critical theory, all of which "argue that the quality of research should be judged in terms of its political effects" (p. 9). Given the technology education field's goals of better positioning the study of technology in U.S. public education, critical theory research may be very appropriate for technology education.

Reliability. In some areas of ethnographic research, identification of reliability is straightforward. If answers to interview or questionnaire items may be termed "correct" or "incorrect," for example, the Spearman-Brown Prophesy Formula may be employed to identify the reliability of the item set (Weller & Romney, 1988). But when the answers are not known ahead of time, substitutions may have to be made for such traditional methods of estimating reliability.

Practical Aspects of Case Study Analysis

There are four general considerations in designing a study using a case-study model: case selection, the role of the researcher in the classroom, data collection, and data analysis and interpretation. The following sections discuss each of these in turn.

Case Selection

It seems self-evident that selecting an appropriate case to study is essential to quality case-study analysis. Krathwohl (1993) developed this typology of cases: *model cases*, which are clear-cut, representative cases, but not necessarily exemplary ones; *contrary cases,* which are missing one or more defining characteristics, and are useful in identifying the boundaries of the research territory; *borderline cases*, which more precisely elucidate these boundaries, and which may or may not be useful to study; *related cases*, which are almost the same as the cases under study, but for some reason (other than simply missing a defining characteristic) are not representative; and *invented cases*, constructed by the researcher (p. 149; 150-153).

The instance of a commercially commissioned study of the effectiveness of Synergistic modules in middle-school technology education may be illustrative. In addition to their primary focus site, Harnisch, Gierl, and Migotsky (1995a, 1995b) studied four other sites, constituting a design that implies that they sought to reduce error by increasing the number of cases. In experimental research, this would demand that random sampling be employed for case selection. It made sense for Harnisch and his associates to employ (nonscientific) sampling, however, because (a) the program being studied existed in hundreds of U.S. schools at the time, and (b) the program is somewhat standardized. But these are uncommon circumstances in studies appropriate for ethnographic research.

Searching for and studying what he called the "typical" case is often an attempt at the randomization or adequate sampling expectations in qualitative research. Mitchell (1984) suggested that finding and reporting a "telling" case can "serve to make previously obscure theoretical relationships suddenly apparent" (p. 239). The argument in favor of studying the exemplary case is compelling, but so is the notion that, since recommendations from many educational ethnographies will necessarily be made for the typical classroom, there is merit to the argument that the typical case be studied; indeed, in educational research, the typical classroom cannot be ignored.

Role of the Researcher in the Classroom

When a classroom is selected to be studied, an important decision to be made before data-collection strategies can be identified is the explanation—if any—the students will be given about the researcher's presence. Fine and Sandstrom (1988) discussed this issue in detail, presenting three basic tactics the researcher can use: *deep cover*, *shallow cover*, and what may be termed *no cover*. Fine and Sandstrom acknowledged that entering the classroom with no pretenses is without ethical peer in the short term. But, they noted, this too has its drawbacks. Regardless of the stance taken, the researcher will always affect his or her research; this is an accepted consequence of ethnography. "The potential for ethical problems is exacerbated as a result of the development of nontraditional research methodologies" such as participant observation (Hammack, 1997, p. 247).

Data Collection

After deciding on a case to study and the role of the researcher in the classroom, the researcher should anticipate the range of data collection strategies to be used. While it is not essential to determine all of these in advance, as a researcher would in an experimental study, such planning will help ensure that the researcher has the necessary resources (e.g., tape recorders, interest inventories, etc.) in the field when they are needed (see Fontana & Frey, 1994; Hall, 1999).

To address their research questions, ethnographers typically use several research methods, which in turn yield several types of data (see Weller & Romney, 1988). The structured and overlapping employment of multiple research methods, multiple researchers, and/or multiple data sources is referred to as *triangulation*. In technology and industrial education research, the three most common forms of data collection are observation, interviews, and document analysis (Genzuk, 2001; e.g., Evanciew & Rojewski, 1999; Foster & Wright, 2001).

Participant Observation

Data from observations vary from "written text that follows a free-association form" to highly structured inventories (Adler & Adler, 1994, p. 380). Notes should refer to "participants, interactions, routines, rituals, temporal elements, interpretations, and social organization" (p. 380). Adler and Adler echoed Goodson and Magan (1991), who noted that observations over time typically evolve from being unfocused, general, and descriptive to being more focused, selective, and in-depth.

Most educational researchers choose *participant observation* as a means of gathering observation data; essentially they become involved, however tangentially, in the teaching and learning they are observing. Participant observation has a number of drawbacks, most notably that due to its high level of subjectivity, it always requires additional techniques for triangulation. If a researcher decides to employ participant observation, then, additional methodologies must be selected as well. "Clearly, observation is not enough" (Pitman, 1991, p. 97).

Informants and Focus Groups

"Ethnographers supplement what they learn through participant observation by interviewing people who can help them understand the setting or group they are researching" (Hall, 1999, n.p.). Interviewing has long been considered central to, and of equal importance to, observation in ethnographic study (Genzuk, 2001). In most of the ethnographic literature, interviewees are referred to as *informants*; interviews with multiple informants are often called *focus groups* (USAID, 1996).

Johnson (1990) discussed two basic criteria for the selection of informants. One was theoretical qualification; the second was innate abilities. This, he said, allowed informants to be selected via a planned procedure.

Procedural matters. In addition to the selection of informants, the researcher must decide the degree to which each interview will be structured. According to Fontana and Frey (1994), the possibilities range from highly structured interviews "in which an interviewer asks each respondent a series of preestablished questions with a limited set of response categories" (p. 363) to radically unstructured interviews. Hall (1999) recommends keeping the questions unrestricted. "Plan open-ended questions which require paragraph answers. If the informant goes off on a tangent…this often leads to very useful information that we didn't know was needed!" (n.p.) Cohen (1984) also recommended open-ended questions because "were we simply to pursue a schedule [of interview questions] of our own devising, we would then be displaying the contrivances of our own minds, rather than discovering the minds of those we want to study" (p. 225). The highly structured question list is also problematic because it is necessarily constructed on the assumption it can apply to all informants (Fontana & Frey, 1994).

Other procedural decisions which need to be made will vary from informant to informant. Not all informants will provide the same quality and quantity of data, so the questions they are asked may vary, especially if time is limited. Also, environmental conditions may not permit the use of tape recording, so the interviewer may resort to manual notetaking, which often distracts the informants and the researcher.

Documents and other data-collection instruments

"In addition to participant observation and interviews, ethnographers may also make use of various documents in answering guiding questions. When available, these documents can add additional insight or information to projects" (Genzuk, 2001, n.p.). Because the data collected via educational ethnography is qualitative and context-specific, it is difficult to construct multiple-choice data-collection documents for ethnography, as most of these instruments yield data which is neither rich nor descriptive (Delamount & Hamilton, 1976). But documents created, modified, or used by students and teachers being observed may generate additional data to either help triangulate information or to inform interview questions. A wide variety of documents may be considered, including

> …budgets, advertisements, work descriptions, annual reports, memos, school records, correspondence, informational brochures, teaching materials, newsletters, websites, recruitment or orientation packets, contracts, records of court proceedings, posters, minutes of meetings, menus, and many other kinds of written items (Genzuk, 2001, n. p.).

Documents containing qualitative data may be analyzed quantitatively using sophisticated computer programs (Stemler, 2001; Rosenberg, Schnurr, & Oxman, 1990), but are usually analyzed visually by the researcher.

Analysis of Case-Study Data

The prescriptive literature in the ethnography field is replete with recommendations to continually review collected data throughout the data collection process. Regardless of whether data review occurs during or after its collection, most ethnographers recommend a schedule of analysis and interpretation with these general steps: case-study data must be analyzed; the analysis must be examined and reorganized; the reorganized data must be synthesized; and the synthesis must be interpreted (e.g., Hall, 1999).

Qualitative data garnered in case-study research is treated similarly to data from other types of ethnographic studies. Mitchell (1984) noted the usefulness of case studies in demonstrating "how general principles deriving from some theoretical orientation manifest themselves in some given set of particular circumstances" (p. 239). Stake (1994) concurred: "case study can be seen as a small step toward grand generalization" (p. 238).

Levstik and Barton (1996) and VanSledright (1995) both used case study models to investigate history education, focusing on chronological thinking and historical understanding respectively. Both extensively employed interview strategies. Levstik and Barton selected a subsample of the interview data and based their coding scheme on it. They reported examples from each of their dozens of categories, devoting comparably little space to synthesis and interpretation. VanSledright took a very different approach. He synthesized his data into three categories and reported these.

Data Reduction. As mentioned above, since analysis may begin during data collection, it is unlikely that any ethnographic study will have exclusive time periods of data collection and data analysis. Even more exactly, Erickson (1992) pointed out, "analysis actually begins while in the field. Choosing which events or persons to record involves making initial analytic decisions" (p. 216). Erickson (1992) suggested a five-stage procedure for the analysis of recorded observations or interviews in field-based educational research:

1. Review the whole event, from start to finish without stopping, taking field notes. During this stage, potential points of interest may be noted.
2. Identify the parts of the event, such as introduction, activity, conclusion.
3. Within each part of the event, identify the organization of the children and the teacher. How do they influence each other?
4. After careful selection of subjects, focus on them, transcribing their words and actions precisely, and just as precisely, pertinent words, actions and reactions of others.
5. Compare the results of analysis steps 4 and 5 with analogous instances from elsewhere in the body of recorded observations.

To analyze written data, Hall (1999) recommended the following procedure: read and re-read the data; code the data based on similarities; categorize the coded data; do a "reality check" of the categorization; and triangulate the data. This process is then repeated as necessary to refine the categories and help identify which items are useful and which are not.

Keeler (1996) was very specific about the data-analysis process in her article describing changes in an elementary classroom when networked computers were introduced:

> The interviews were first transcribed onto a word processing program. The verbatim text was then sorted and ordered…Themes and patterns that emerged from several readings of the narrative data were then coded and the narrative data was then sorted by codes. The comments were further condensed and factors of importance began to emerge from the text. Direct quotes were preserved where they served to enhance classroom profiles and illuminate themes. (p. 332-333)

Interpretation of Case-Study Data

According to Genzuk (2001), "interpretation involves attaching meaning and significance to the analysis, explaining descriptive patterns, and looking for relationships and linkages" (n.p.). Often the researcher will use a logical-organizational process to kick-start the interpretation phase. In Kinney's (1995) study of the impact of educational change on elementary students in inner-city Baltimore, "fieldnotes from observations and student statements from interviews were sorted and categorized based on their consistency and similarity to specific issues and concerns" (p. 8). These issues and concerns were essentially his research questions. Kinney also consulted a nationally recognized expert to help interpret the data. Ennis (1996), who investigated the impacts of disruptive students on curriculum in ten U. S. high schools, used a different approach. She first wrote narratives describing each of her ten cases, then examined these for "tentative assertions, common themes, and discrepancies" (p. 148).

Interpretation, or *theorizing*, is followed by the selection of episodes or facts which exemplify, or in some cases challenge, the theory. Incidents which refute the theory under certain circumstances may prove useful in further refining the theory (Stemler, 2001). Items selected in this stage may

be used to demonstrate the veracity of the theory, and may be used in the explication of the theory as well (see Krathwohl, 1993).

Prospects for Case-Study Research in Technology Education

Three recent prescriptive reviews of the technology education research base provide scores of potential case-study research projects in areas where research is lacking. These papers are Zuga's (1996) *Review of technology education research*, Petrina's (1998) content analysis of the first eight volumes of the *Journal of Technology Education,* and Lewis's (1999) "Research in technology education—Some areas of need."

Zuga (1996) summarized needed technology education research in two points, the first being "researching the effectiveness of technology education via the ability to meet goals which the professionals in the field purport to hold" (p. 11). Clearly the methods used to answer research questions about the effectiveness of technology education for delivering—as an example—related academic content could be measured quantitatively via standardized academic tests. But delivering related academic content is only one of those "goals which the professionals in the field purport to hold." Technology education is also believed to increase students' "technological literacy" (ITEA, 2000) and improve self-esteem and other social variables (Wright, 1992).

How best to study these questions? There are several problems preventing the straightforward application of quantitative models in such studies. For example, there are no accepted quantitative tests of technological literacy, so the researcher will have to use a self-designed or adapted test which will be under-normed. Because there is no accepted definition for technological literacy, such a test will vary from researcher to researcher, making studies less generalizable and less comparable—and by extension making case-study analysis less objectionable.

A second problem in applying quantitative methods to a study of the effects of technology education is that, even if the outcomes (academic, technological, social, etc.) could be perfectly quantified, determining the proportion of the outcome attributable to technology education (e.g., via analysis of covariance) would require the replication of the experimental conditions in several classrooms, along with a number of "control" classrooms. While this would not be impossible, the cost and effort would be colossal, even when compared to a multi-observer longitudinal case study using ethnographic methods.[1]

Zuga's other major recommendation for technology education research, "addressing issues of identifying and implementing integrated curriculum through technology education for all children taught in a constructivist manner" (p. 11), is perhaps an even better candidate for case-study research. Zuga herself has remarked in several reviews of research that qualitative methods may be the most appropriate for addressing the major gaps in technology education research. Petrina (1998) identified seven "central framing questions," which the technology education field needs to answer. Each is constituted by a unique combination of several of nine research areas. The seven questions are

- How do we come to practice and understand technology?
- Toward what ends and means is the subject practiced?
- What should be the nature of technological knowledge?
- How should the content of the subject be organized?

- How is the subject today influenced by its history?
- How is technology practiced across cultures?
- Who participates in the subject and why or why not? (paraphrased in Lewis, 1999, p. 42.)

While most of these may be best studied via nonquantitative means, several in particular are good candidates for case-study research. The first part of the final question, "who participates in [technology education]?" may be responded to using quantitative means; researchers could in theory collect rich enrollment and course participation data and break it down by socioeconomic status, gender, race/ethnicity, special-needs status, and the like. In fact such quantification would be needed to inform the second part of the question. But to respond to that second part—"why or why not?"—lends itself to case-study analysis, with the case unit viewed either as individual students or a school or system with sizeable and representative groups of those who do and do not participate in technology education.

Other of Petrina's questions, such as cultural comparisons of technological practices, might be ideal but impracticable as case studies. Yet a meta-analysis of existing case studies, each considering a different culture, might be useful to the field.

Lewis (1999), making reference to Petrina, identified "areas of research potential" for technology education (p. 43), including to technological literacy; perceptions, conceptions, and misconceptions about technology; creativity; gender; curriculum; and teachers. Several of these topics lend themselves to case-study research. One possible research model for investigating misconceptions about technology would be to observe one or more classes of students as they learn technological concepts; analyze their written explanations of those concepts; use this analysis to identify those with high and low incidences of misconceptions; and select informants from these two student groups. With this three-pronged approach to data collection—observations, interviews, and document analysis, triangulatable data would be generated which could be used to begin to address questions of student misconceptions about technology.

Similar models could be constructed for many of the other research areas identified by Lewis. Consider, for example, "questions pertaining to technology and creativity" (p. 46) and "questions pertaining to gender" (p. 47). Taking a mixed-gender classroom, or other group of students, as a case and observing and interviewing them as they engage in potentially creative technology activities might be the start of an investigation of several of Lewis' "areas of research potential."

Elementary-School Technology Education as an Example

As suggested by the work done by Lewis, Petrina, Zuga, and Hoepfl (e.g., 1997, 2001) the range of research topics in technology education appropriate for case-study research is potentially limitless. Specifically, the following are three areas of needed research in elementary-school technology education(ESTE) (see Foster, 1997):

Inservicing in ESTE. Over the past ten years, thousands of elementary teachers have been in-serviced in the area of technology education at national and state technology education conferences. Have these in-service sessions had an impact? How do teachers approach technological content in the existing curriculum (e.g., social studies, science, etc.) before and after attending in-service sessions?

Assessment via ESTE. If elementary-school teachers implement technology education in their classrooms, how do they assess student performance? In some cases (e.g., Foster, 1997), teachers implementing ESTE reduced the number of traditional assignments they used in their classrooms. Could ESTE be a vehicle for assessing students' social skills, such as working with others?

Student and teacher roles. Does ESTE have potential in delivering on the challenge of having elementary teachers become facilitators of knowledge rather than dispensers of it? How do successful ESTE teachers prepare for activities for which the outcome is uncertain? Content aside, is there a difference between constructivism and using ESTE as a delivery method, as suggested by Todd and Hutchinson (1991)?

Many of these questions could be addressed via quantitative research; for instance, teachers could be surveyed or interviewed to determine their perceptions of student and teacher roles, assessment, and the like. But to move beyond opinions, in-depth, on-site study is much more powerful.

Final Thoughts

Case-study analysis is only an appropriate educational research model for a limited range of research questions, specifically those in areas of education where foundational questions remain unanswered. It is clear from the literature that technology education is such a field. Several of the most respected technology-education researchers have identified large domains in which little or no quality research exists, and have pointed in general to the need for more qualitative research to fill these voids.

At the same time, technology educators have three important ingredients to beginning their own case-study research. There is now a small but growing literature base demonstrating the unique benefits of technology education, especially at the elementary level (Hoepfl, 2001). Secondly, there is also a well-established methodological knowledge base explicating the methods of case-study analysis. Finally, the editors of major journals in the technology education field have demonstrated a willingness to publish qualitative and case-study research.

The challenge, then, is for interested technology education professionals and graduate students to view research in the field as wide open for exploration with the appropriate methods—such as, but in no way limited to, case-study analysis.

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