The Politics of Research in Technology Education: A Critical Content and Discourse Analysis Of the *Journal of Technology Education,* Volumes 1-8

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In the fall of 1987, the *Journal of Technology and Society* (JTS) was launched as a semi-annual, "scholarly, refereed journal for professionals in technology education" (Blankenbaker, 1987, n.p.). This came on the heels of the change of name from the American Industrial Arts Association to the International Technology Education Association (ITEA). The new journal was intended to give scholarly direction to a profession in transition, and provide an outlet for addressing the increasing publishing demands on teacher education faculty. Kendall Starkweather, Executive Director of ITEA was Editor-in-Chief, and E. Keith Blankenbaker of The Ohio State University (OSU) served as Managing Editor. As the first journal of its kind in the U.S., committed entirely to technology education, the *JTS* survived in its original form only two years—three issues. Near the end of its first year of publication, the fate of the *JTS* would be shifted from OSU to Virginia Polytechnic Institute and State University (VPI).

Beginning October 1988, Mark Sanders became the Editor and James LaPorte the Associate Editor of what would become the *Journal of Technology Education* (*JTE*) in the spring of 1989. Like the short-lived *JTS*, the *JTE* would be co-sponsored by the ITEA and the Council on Technology Teacher Education (CTTE) (Sanders, 1995, pp. 597-598). And like the *JTS*, the *JTE* was invested with scholarly intentions beginning with its first issue. The *JTE* has matured in this form since that inaugural issue of 1989. The completion of the eighth volume of the *JTE* in the spring of 1997 ushered in the first change in the journal's leadership since its inauguration. James LaPorte was appointed the new editor, marking a time for anticipation and reflection. Sanders completed his duties as editor in fall 1997, ending with the first issue of volume 9.

The stability of the *JTE* alone over the past nine years might be enough to suggest its success. The journal has increased its constituency from an initial core of 57 subscribers to over 450 from across 13 countries. In the spring of 1991, the journal was made available for electronic access and has continued to be on the frontier of electronic journal publishing through the internet. During 1995-1996, the journal was accessed 99,553 times via the World Wide Web, and

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the journal's site received 157,111 electronic accesses in calendar year 1997. This growth has come at a time of a proliferation of publishing outlets and a dwindling number of technology teacher educators in the U.S. By most impressions, the *JTE* has matured qualitatively as well. Indeed, quantitative growth and quality are interrelated. Despite its relatively brief history, the *JTE* may be poised to rival the quality of peer disciplinary journals such as *Studies in Art Education* and *Science Education*. But how can the contents of the *JTE* be judged? Whose research and what has this journal published? Who and what should the *JTE* editors and reviewers be encouraging?

This is a meta-study of research in technology education as manifested between the covers of the first and sixteenth issues of the *JTE* published from 1989 to 1997. It is intended as a review of the Sanders years of the *JTE*, as well as an influence on the way the *JTE* will be shaped within the years to come. This study should be seen as a sign of maturity for the journal and should in itself provide a discourse for reflection and anticipation. Indeed, this is a study of a profession's *episteme* and its journal.

This study is cast in the larger framework of the politics of technology education and a concomitant politics of vision. The epistemological trajectory of the article is from the descriptive "what is?" - to the normative - "what ought to be?" In the final analysis it is argued that if technology education is going to overcome its past of conservatism and isolation to become a vibrant enterprise, researchers will necessarily have to critically engage with an epistemological world outside their immediate cultures. A critical turn in the practices of these researchers could make a difference in the participation of individuals belonging to the underrepresented groups of technology education, and technology and the trades, at large.

Researching Research in Technology Education

Research in technology education has been a site of contention for some time. Recent scrutiny seems particularly direct in addressing what has become a problematic enterprise. Research agendas have appeared through the 1990s with intention of reforming the enterprise (Foster, 1996; R. Hansen, 1995; Waetjen, 1991). These are in themselves problematic, and suggest a variety of responses to a variety of problems. Those who have done research on research in technology education, or the *episteme* of this profession, have described a malfunctioning practice (Foster, 1992; Zuga, 1994, 1995, 1997). If as Zuga described after an exhaustive study in 1994 (p. 8), research in technology education is "narrowly defined and inwardly focused," then what reform measures ought we consider?

Zuga's study of 220 reports of research, unpublished and published in the U.S. between 1987 and 1993, was incisive and insightful. About 68% of the research she studied was devoted to curriculum, and 63% dealt with the secondary levels of educational systems. About 59% used educators as subjects of research. With regard to methods, 83% were quantitative with 65% of these being descriptive. These data are similar to those of Foster (1992), who found that about 92% of 503 graduate research theses in industrial and technology education were quantitative, and 54% were of the survey type. McCrory's

(1987) data are also similar, although unreported as so. An important insight of both Foster and Zuga is that this predominance of quantitative, descriptive research reinforces the marginalization of qualitative, interpretive studies. This predominance informs only a limited range of problems within a limited context and depth of understanding. Zuga addressed these issues of quality in her sample, as the compiled statistics tell only part of the story.

Zuga's report provides a refreshing counter-narrative to the "progress" ideology inherent in much of the research she reviewed. She pointed out a number of contradictions between what was researchers rhetorically said about technology education and what was being studied and reported in research. For example, technology educators may speak in favor of a more equitable profession and curriculum, but a homogeneous group of researchers studying mostly homogeneous subject samples contradicts this concern. Zuga's conclusion is that there is little minority participation in research and little that translates into minority interests (p. 39). Women, like other visible minorities in technology education, are notably underrepresented in research. These demographic problems are considerable given the percentage of studies which use quantitative methods, be they experimental or survey. Curriculum development through research has relied on surveys of this uniform demographic leading to, as Zuga reports, "a closed circle of ideas" (p. 62). If technology education is perceived by young women as a masculine subject, it may be a reflection of the survey informants' gender biases (re)produced in curriculum over the past decade. It is here, with Zuga's critique of the means *and* ends of research in technology education where this study begins (Zuga, 1994, 1995, 1997).

This study is meant to complement the investigations of Foster and Zuga into the methodological issues of research in technology education. I deal with these and other structural patterns and, like Zuga, critically address issues of research content, ideology, and quality. The *JTE* is a sample of a different kind, albeit as representative, than has been reviewed. In inference, similar to Foster and Zuga, I evaluate the fidelity with which articles in the *JTE* represent research in the profession. In addition to the intentions of these two authors, this analysis aims to provide knowledge of the politics of research in technology education.

Researching Research: A Methodological Explanation

A pragmatic investigation might suggest that research in technology education is insubstantial and is not working. But what means would the pragmatist use to come to this conclusion? How can we come to understand research - its content, methods, and quality - in technology education? This study is a methodologically variant attempt to critically inform these epistemological questions. In the larger epistemological scheme, this meta-study draws on meta-ethnography and related methods in critically translating the textual world (Gitlin, 1994; McLaren & Giarelli, 1995; Noblit & Hare, 1988). Data from the JTE across eight volumes are triangulated through quantitative

and qualitative analyses, with content and critical discourse analysis combined for this task (Jick, 1983).

Content analysis provides a quantitative treatment of issues of quality. It is a systematic method in the social sciences by which manifest and latent contents of spoken or written text are determined (Babbie, 1983; Krippendorff, 1980; Rosengren, 1981; Weber, 1990). Uses for this method in education have ranged from detecting textbook difficulty to exposing biases and propaganda. In simple form, this method involves identifying units of analysis and counting the number of times particular words, or units, are used, within semantic contexts. These units form categories which provide another level of analysis where coding frameworks can be used. Conceptual and operational codes, like conservative or radical, and economic or cultural help to give latent meaning to analysis of manifest content. The techniques of counting, categorizing and coding were used in this study.

After isolating references from articles for this study, 385,334 words in the first eight volumes of the *JTE* were searched using search engine software. Trend analysis across these eight volumes was not a purpose of this research, but the two most recent volumes were isolated for analysis of potential changes and continuities. With no glaring differences noted in authorship, methods, contents or citations, the eight volumes of the *JTE* were read and treated as a single, scholarly text for interpretation. Other than for the purpose of counting methods and subjects, guest and refereed articles were treated no differently than "From the Editor," book review, editorial, and reaction articles. All were assumed to constitute the scholarly text of the *JTE* and used as units of analysis. Methodological and theoretical concepts such as ethnography and critical theory were counted, along with categorical words such as class, gender, race, sexuality, and skill. Methodological and theoretical terms and phrases were drawn from contemporary texts that deal with method and theory (Babbie, 1983; Gitlin, 1994; Jaeger, 1988; Lincoln & Guba, 1985; McLaren & Giarelli, 1995; Mertons, 1998; Palys, 1997). In all, 46 concepts relating to research categories of content, method and theory were counted in the *JTE* text. Authors (145) and references (2,073) were also searched to inform author typologies and citation patterns. Names of seven of the most often cited authors in education *and* Science and Technology Studies (STS) journals between 1986 and 1997 were searched in the *JTE* references. This list of authors was drawn from the *Social Science Citation Index*, volumes 1986-1997. In total, 19 author names and concepts were counted in the *JTE* references for an analysis of citation patterns. Counting and categorizing provided provisional data for a coded, deeper analysis. In this way, a grasp of the journal's manifest content facilitated an interpretation of latent meanings through discourse analysis.

Critical discourse analysis provides a means of dealing with latent issues of text quality, such as ideology and symbolic meaning. Discourse refers to recurrent statements, themes and wordings across texts, which represent orientations to the world. Discourse analysis is a method of text analysis in which the "text" can represent the spoken or written word, an image, narrative or media; text is the artificial representation of the world (Ettinger & Maitland-Gholson, 1990; Janks, 1997; Lindkvist, 1981; Luke, 1995; Patterson, 1997). It is

a method that assists the researcher in linking text to structural formations and relations of power. Questions central to critical discourse analysis are: "How is the text positioned or positioning? Whose interests are served by this positioning? Whose interests are negated? What are the consequences of this positioning?" (Janks, 1997, p. 329). This method draws historically from hermeneutics, linguistics, rhetoric, and semiotics, or more generally from critical and post-structuralist theory. On one level, this involves a critical reading of how texts are constructed. On another, it involves a critical reading where text and context are culturally located and interests identified. Critical discourse analysis is a means of tying texts together and of demonstrating the political and powerful nature of seemingly mundane statements and symbols. In education, uses have ranged from demonstrating how schools govern through surveillance and moral regulation to how textbooks embody sexist and racial discourses and structure thought processes (Janks, 1997; Luke, 1995).

In this study, discourse analysis was used on its macroanalytical level to substantively address issues of the politics of research in technology education. Discourses of class, economics, gender and race were analyzed with regard to marginalized and minority discourses. These discourses were read against the codes of the content analysis, where manifest content was carried as empirical evidence of latent meaning. As discourses mirror content, they provided a second level of data for coding and decoding the *JTE* text.

While valid for the purposes of the research, content and discourse analysis present particular challenges to validity and reliability. Are concepts counted in the *JTE*, such as economic competition or scientific subjugation, indicators of codes such as conservatism? Are concepts such as class, ecology, gender, labor, race or sexuality indicators of critical politics? Are certain discourses indicators of these codes? For unobtrusive research, these are the most productive methods for addressing text quality and latent meaning (Babbie, 1983; Luke, 1995). They make the arrangement of empirical data possible where other methods fall short; they allow for a quantification of qualitative data. They have facilitated a micro-level of analysis that complements the macro-level of Foster (1992) and Zuga (1995). The concreteness of these data offers a fairly high degree of reliability. Articles were randomly read and counted 'by-hand' as a cross-check on the computer searches. It was assumed that the counts would not change from researcher to researcher. Categories were drawn from current literature, and categorizing was done by the researcher. Categories such as authors, citations, research methods, and theories are common to meta-studies of research. The category "Analytical Units of Substance" was created to assist in identifying unit indicators of content. It was assumed that another researcher would use similar categories and units for analyzing the inherent biases or politics of research in technology education. Analytical units, or concepts, counted for comparison were of the same kind. For example, the number of times a unit such as "math" or "science" was counted could be compared with the number of times "art" or "ecology" was counted. Units were counted in semantic context. For example, a unit such as "industry" was counted if the intended meaning referred to commerce or trade and not to the subject "industrial arts." After

categorizing and counting, units were coded. For example, the relatively high frequencies of "math," "science," and "industry" compared to the low frequencies of "gender," "labor," and "race" indicated a conservative code, or discourse. Researchers can code, decode and recode the units of the content analysis, but this is somewhat of a matter of interpretation. Reliability is improved when, in addition to unit scoring, meaning is derived through analysis of contents in their semantic contexts, or through discourse analysis. Here, the researcher must make a persuasive argument that a code such as conservatism can be read from particular counts of manifest data *and* from analysis of latent meaning. It is open to debate whether the *JTE* data are valid units of analysis for a meta-study of research in technology education. Regarding this issue, which is also one of generalizability, conclusions of this analysis are consistent with similar analyses by Foster (1992) and Zuga (1994). There is a high degree of intersubjectivity among meta-studies of research.

While content and critical discourse analysis configured the analysis of the *JTE*, they did not provide some foolproof progression from problem to data with the researcher distanced in some remote objectivity. My own biases in selecting units for analysis and in coding discourses for interpretation reflect my experiences and concerns with the politics of technology education. The relation between myself as researcher and the text is one of familiarity and pride, but also uneasiness. I know the *JTE* text, its editors, and many of its authors. I've published four of the articles reviewed and feel as uneasy with these as with the others. As an Editorial Board member who reviews manuscripts, I want to be proud of what is published and I want the *JTE* to be different in the future. As a teacher educator in a Canadian university, I want the *JTE* to make a difference in my own research and teaching practices and to reflect an international audience. As a 39-year-old white male, I want the journal to be more youthful, responsive to feminism, and colorful. To this analysis, I also bring an understanding of cultural and critical studies, weave this into the research design, and look forward toward an era of critical discourse in the *JTE*. The journal is thoroughly a product of its profession. In the final analysis, I'll argue that the relationship ought to be - and can be - reversed.

Contents Without Contention: But Who's Counting?

Who is authoring, what is their status, and where are they from? What methods and theories are, and are not, being used? What units, categories and terms of analysis are and are not prevalent in the research published in technology education? This section is a descriptive and categorical analysis of the contents. Codes of analysis of the discourse in the *JTE* will be addressed in a later section.

Descriptive statistics describe a state of affairs in the *JTE* where 68% of the authors are teacher educators, 84% are from the U.S., and 87% are male (Tables 1-3). As would be anticipated in a scholarly journal in education, a majority of authors are teacher educators. This group accounted for 68% of all articles or reviews (Table 1). The second most active group of authors was graduate students. This group of students have been involved in 23 published articles or reviews. Four of the 19 book review authors, two of the 15 editorial authors, and

one of the three reaction authors were graduate students. Graduate students certainly have a presence in the *JTE*, but without comparative data, it is difficult to comment on their productivity. Given that the *JTE* was initiated in the US, it is not surprising to see that 84% of the authors are from the U.S. (Table 2). Twenty articles were published by international authors, with Canadian and English authors accounting for just over half of these. Of the seven guest authors, two were from outside the U.S. and one was a woman.

Table 1
Status of Authors of Articles in the JTE

Status	Frequency (All articles*)	Percentage of Total
Technology Teacher Educators	99	68%
Graduate Students	23	16%
Other University Faculty	10	7%
Center or Project Directors	4	3%
Teachers	3	2%
State Supervisors	2	1%
Independent Researcher	1	--
Museum Researcher	1	--
ITEA Representative	1	--
CTTE Representative	1	--
Total	145	

*Authors of "From the Editor" articles were *not* counted except for issue 1(1).

Table 2
Country of Authors of Articles in the JTE

Country	Frequency (All articles*)	Percentage of Total
US	125	84%
All International	20	16%
Canada	(6)	
England	(5)	
Australia	(2)	
Hong Kong	(2)	
The Netherlands	(2)	
Taiwan	(2)	
Japan	(1)	
Total	145	

*Authors of "From the Editor" articles were *not* counted except for issue 1(1). Fewer than 5% are recognized by the researcher as persons of color.

The women's percentage (13%) of articles in the *JTE* is above their representation in the industrial and technology education professoriate in the U.S., where about 94% of faculty are men (Erekson & Gloeckner, 1988; Erekson & Trautman, 1995) (Table 3). The percentage of women authors is about the same across the 76 guest and refereed articles and the 36 book review, editorial and reaction articles. This is an improvement over the track record set by the *Journal of Technology and Society*, in which there was one woman out of 25 authors in its three year existence. It is also a higher representation than in the ITEA, where women represent only about 2% of the approximately 5,600 members.

Table 3
Sex of Authors of Articles in the JTE

Sex	Frequency (All articles*)	Percentage of Total
Men	126	87%
Women	19	13%
Total	145	

*Authors of "From the Editor" articles were *not* counted except for issue 1(1).

Authors in the *JTE* are not self-identified as belonging to any racial group, and my estimate is that fewer than 5% are non-white. This multicultural demographic appears to be very similar to that of the industrial and technology education professoriate, where 91% are white. Demographics of the authors are also somewhat similar to the membership of the ITEA. Of these, about 6% are African American or other visible minorities (Ulatowski, 1993; Volk, 1995). Only so-called "developed" or financially enfranchised countries are represented in the *JTE*. Authors from African, Middle Eastern, or Central and South American countries, for example, are not represented.

A descriptive analysis of the contents of the articles indicates that 62% of the research methods used are either conceptual or descriptive and 35% of these articles involve human subjects (Tables 4-5). Of the 96 articles published, 36, or 37%, are conceptual in method and deal with curriculum (Table 4). About 25% of all articles were descriptive, drawing on surveys, Delphi panels, or documents for analysis. The balance of articles were distributed over ten different types of methods with the largest percentages being conceptual (37%) and descriptive (25%). These data differ slightly from Foster's (1992) review of research in industrial education, where 53% of 503 dissertations and theses were descriptive. The data also differ slightly from Zuga's (1994) review which found that 65% of 220 research reports in technology education were descriptive. This majority of articles in the *JTE* dealing conceptually with curriculum is reflective of Zuga's finding of what she termed a "curriculum fascination" (p. 11) in her sample. The *JTE* data are similar to those in Foster's and Zuga's research in that few researchers have used historical, quasi-experimental and experimental, and philosophical methods (see also Hoepfl, 1997; Zuga, 1987). It is evident that technology educators have yet to make the interpretive shift that other researchers with "practical" pasts have made. For example, home economists

have embraced interpretive methods as central to their research questions (e.g., Hultgren & Coomer, 1989). None of the studies in the *JTE* reflects the sustained commitment to subjects that ethnographic, hermeneutic, and phenomenological research requires. As indicated in the *JTE*, researchers are not stepping back to analyze conceptual and methodological issues in research. There has not been a thematic meta-study of research (e.g., problem solving), and only one methodological study (Pannabecker, 1995) appeared in the first eight years of the *JTE*. Hoepfl's methodological study published in volume nine was a welcome addition to Pannabecker (1995).

Table 4
Methods Used in JTE Articles

	Frequency of Methods*				
Method	V.1-6	V.7	V.8	Total	Percentage
Conceptual (Curriculum)	27	3	5	35	37%
Descriptive (Survey)	10	2	1	13	14%
Descriptive (Documentary)	6	0	1	7	7%
Descriptive (Delphi)	4	0	0	4	4%
Descriptive (Correctional)	1	0	0	1	--
Quasi-Experimental	5	2	1	8	8%
Discourse Analysis	5	1	2	8	8%
Case Study	5	1	0	6	6%
Historical	4	1	0	5	5%
Philosophical	1	0	1	2	2%
Ex Post Facto Analysis	2	0	0	2	2%
Causal-Comparative	1	0	0	1	--
Content Analysis	1	0	0	0	--
Experimental	1	0	0	0	--
Instrument Validation	1	0	0	1	--
Methodological (Historiography)	0	1	0	1	--
Total				96	

*"From the Editor" and "Book Reviews" not included.

Just over one-third of the articles in the *JTE* involved human subjects (Table 5). Although there were few descriptive demographic data provided by a large majority of *JTE* authors who dealt with human subjects, there are data that describe the status of their subjects. And about two-thirds of these studies involved teachers, university teachers and students, or state supervisors and industrial representatives, or other adults. The remaining third involved middle or secondary school students. Hence, 11% of the total articles in the *JTE* involved students in the schools. There are not comparative data, but evidence is suggestive that relatively little time has been spent investigating the practice of technology at the local, school-based level. In regard to research with human subjects, 26% of the 34 studies reviewed provided sufficient demographic data for meaningful analysis. The remaining 74% of the studies included little

descriptive data other than status (i.e., student, teacher, principal, etc.). Given the demographics of the *JTE* authors, is it just common sense that the subjects are white, male and of a middle class background?

Table 5
Human Research Subjects in JTE Articles

	Frequency of Articles with Human Subjects*				
Human Subject	V.1-6	V.7	V.8	Total	Percentage
Teacher Educators	7	0	1	8	24%
Secondary Students	7	0	0	7	21%
Teachers	5	1	0	6	18%
University Students	2	2	0	4	12%
Middle School Students	2	0	2	4	12%
Mixed groups (Adults)	2	1	0	3	9%
State Supervisors	1	0	0	1	2%
Industrial Representatives	1	0	0	1	2%
Elementary School Students	0	0	0	0	0
Total				34	

Percentage of all articles using human research subjects=35%
Percentage of these articles providing demographics other than status=26%
*"From the Editor" and "Book Reviews" not included

It is not clear why authors have concealed, or not collected, sufficient demographic data. To be sure, the demographic mystery left by these authors diminishes the reliability and validity of the subject-oriented research of the *JTE*. There is also an absence of authorial demographics and positionality, making the subject-oriented research suspect as presented. This research should *not* have been published without basic demographic data of author and subjects necessary for interpretation, and a bracketing of sampling biases.

About 45% of the articles focus on practices in junior and senior high schools (i.e., grades 7-12) (Table 6). Another 42% focus on practices in teacher education institutions and the balance of articles are general. Two articles out of 96 deal with elementary school practices. Little is surprising about these data. Over 90% of the *JTE* authors are affiliated with secondary teacher education and probably taught in secondary schools at one time. The vast majority of these deal with student teachers in the secondary programs and typically have few affiliations with student teachers in the elementary schools. Referring back to Table 5, we can see that 11 of the 43 studies that address school practice at the 7-12 grade level, or 26%, involved students. Although the lack of demographic data for this group has made interpretation difficult, the studies that were locally school- or district-based were most likely done in mainstream schools in middle to upper class, white, suburban communities. Only one of these studies problematized gender (Siverman & Pritchard, 1996). Hence, there is not evidence to suggest that *JTE* researchers have ventured to study alternative

schools, rural or urban schools, summer camps, same-sex, or same-race programs.

It is evident that a very small percentage of *JTE* researchers used a theoretical framework which would enable a substantial interpretation of, and critical insight into, their data (Table 7). The atheoretical nature of the *JTE* articles is reflected in the types of subjects and sites of research chosen, as indicated in the discussion of Tables 5 and 6. The data suggest a very minimal engagement with educational or social science theory and evident engagement is limited to a single author in places. For example, O'Riley's (1996) work accounted for all uses of feminist, Foucauldian, and post-structural theory. Pannabecker's (1995) work accounted for 13 of 14 references to social constructivism. Three of four of the references to Marx were in book reviews and the fourth reference was to a context of the 1930s. For all the studies that dealt with learning, there were few that drew on contemporary learning theory. While there were a few references to constructivist learning theory, only one conceptual article referred to situated learning, a more current theory (Wicklein, 1997). Learning theories such as constructivism and sociocultural theories like enactivism and situated cognition have been very useful in education and social science research circles, but are not used by the *JTE* researchers (Lewis, Petrina & Hill, in press). Zuga noted this problem in her sample of research practices (1995; 1997, pp. 210-212). We could reason that since there were not any studies that were ethnographic, hermeneutic, or phenomenological, there would be few studies where theories informing these methods would be used (Table 4). But this would be faulty reasoning as the relevance of critical ethnography has been demonstrated far beyond strict anthropologies (Anderson, 1989; Darrah, 1996; Lakes & Bettis, 1995). Neither are there references to critical pedagogy and its constituent theories, which are in no way specific to particular methods.

An understanding of the interplay among data, method, theory, and substance has not been demonstrated by a large majority of *JTE* authors. Issues of gender are nearly incomprehensible without insight given through feminist and masculinity theories. There is the same relationship between race, social justice and equity theories, and post-colonial theory.

Table 6

Research Subjects of JTE Articles

	Frequency of Research Subjects*				
Category	V.1-6	V.7	V.8	Total	Percentage
7-12 Curriculum Practices	37	3	3	43	45%
Teacher Education Practices	29	7	4	40	42%
General	8	1	2	11	11%
K-6 Curriculum Practices	0	0	2	2	2%
Total				96	

*"From the Editor" and "Book Reviews" not included

Table 7
Analytical Units of Method and Theory

Unit	Frequency of Terms (All articles) V.1-6	V.7	V.8	Total
Social constructivism (ist, constructivism)	13˚	0	1	14
Constructivism (-ist)	6	1	1	8
Phenomenology (ical)	6	0	0	6
Feminism (ist)	0	5*	0	5
Ethnographic	3	1	0	4
Marx (ist/ism)	4	0	0	4^
Hermeneutic (s)	3	0	0	3
Post-structural	0	3*	0	3
Foucault	0	2*	0	2
Post-modern	1	0	1	2
Reflexive	1	0	1	2
Sociology (not subject)	0	1	0	2
Situated Cognition/Learning	0	0	1	1
Actor-network theory	0	0	0	0
Critical Pedagogy	0	0	0	0
Critical Theory	0	0	0	0
Distributed Cognition	0	0	0	0
Queer Theory	0	0	0	0
Sociocultural Theory	0	0	0	0

*All counted in O'Riley (1996)
˚All counted in Pannabecker (1991)
^3 of 4 counted in book reviews

Table 8 provides a sense of the relationship among method, subject, theory, and substance. For example, O'Riley used a critical discourse analysis as a method for her study and she problematized gender and race as substantial issues of content. Outside of O'Riley's and Silverman & Pritchard's (1996) work, gender appears as a minor concern given the low frequency of indicators such as feminism and masculinity (Tables 7 and 8). Kohlsmith's framing of gender was done in regard to a review of *Teaching Peace*. Lakes' (1990) conceptual work problematized labor as a substantial analytical unit in technology education. Hansen (1996) used class to frame his analysis of technology education. But these authors account for over 60% of the references to class, gender, labor and race, and for over 90% of the references to gender or racial equity. Empirical work on sexuality and queer theorizing have not been attended to by *JTE* researchers.

Aside from a few researchers' work, the *JTE* studies have been insubstantial with regard to critical issues of appropriate technology, class, ecology, gender, labor, race, and sexuality; and the *JTE* is insubstantial to an understanding of the way inequities play out in technology and the trades. As indicated in Table 8,

sociological methods and theories, which are essential to understanding these inequities, are not used. Indeed, critical theory is antagonistic to an uncritical alignment with conservative, economic interests and the maintenance of *status quo*.

Table 8 also provides an indication of the degree to which an alignment between math, science and technology education has been manifested in the content of a research journal. This table also indicates the degree to which *JTE*

Table 8
Analytical Units of Substance

	Frequency (All articles)			
Unit	V.1-6	V.7	V.8	Total
Scien(ce) (tific, tist)	901	141	166	1208^
Math(ematics)	374	42	54	470
Vocation (al)	258	24	15	297
Industry (not subject)	245	17	10	272
Design (Not Design & Technology, Curriculum, Instructional, Research)	162	29	79	270
Engineer (ing)	160	55	18	233
Economic (s) (not socio-economic, Home Economics or efficiency)	122	16	24	162
Cooperation (Student)	131	6	8	145
Business (commerce, not subject)	51	13	6	70
Art (Not industrial arts)	38	6	9	53
Gender (not sex, gender gap)	2	19*	6	27
Compete (ition)(national, advocacy)	37	0	2	39
Compete (ition)(student, advocacy)	25	3	2	30
Labor (not -force or -dept)	13˚	2	2	17
Class (not school)	5	4'	0	9
Race (ial)	7	8~	1	16
Aesthetic (s)	4	1	4	9
Equity (Racial)	0	7	1	8
Ecology (ical)	1	1	4	6
Equity (Racial)	2	2	0	4
Masculine (ity)	0	3	0	3
Appropriate Technology	0	0	2	2
Cooperation (National)	0	0	0	0
Sexuality (Gay, Lesbian)	0	0	0	0

*14 counted between Kohlsmith (1996) and O'Riley (1996)
˚All counted in Lakes (1990)
'All counted in Hansen (1996)
~All counted between Hansen, Kohlsmith and O'Riley
^If references to the National Science Foundation or other science associations are removed, the total is 1008.

researchers have aligned themselves with industrial and economic needs. This may be an indication of the degree to which this has happened at the expense of alignments with art, labor and ecology. Few authors in the *JTE* have been critical of this. Whereas science and math have received substantial attention, as suggested by the 1,208 and 470 respective references, attention to art and ecology is insubstantial. Attention to economic issues, as suggested by the 162 references that were counted, has been much more substantial than attention to environmental or cultural issues as indicated by counts of class, ecology, gender, labor, race, and sexuality. References to industry (272 counted) and national economic competition (39 counted), especially during the first 6 volumes, suggest substantial attention. The content of the *JTE* is insubstantial with reference to cooperation between countries. Although references to cooperation (145 counted) learning out-paced the references to competition between students by almost five to one (30 counted), this is underwritten by a substantial productivity content. In other words, students should learn to cooperate so their country is more economically competitive.

Given this issue of national productivity, it is not surprising that a substantial amount of attention has been paid to skill (Table 9). General skills have been the most popular of the types of skill counted, and along with problem-solving skills, received 220 references. A bit more attention has been paid to technical and work force skills, supporting the findings on national productivity. Although technology is differentiated from vocational education in the references made to vocation (Table 8), these differences may be exaggerated. Over 38 different types of skill were referred to in the *JTE* suggesting confusion, which could be resolved through attention to an analytical framework of technological practice (Jones, 1997; McCormick, 1997; Olson & Hansen, 1994; Petrina, 1998).

Table 9

Analytical Units of Substance (Skill)

	Frequency (All articles)			
Unit	V.1-6	V.7	V.8	Total
Skill (general)	115	3	37	155
Skill (technical)	70	16	35	121
Skill (work force and occupational)	107	6	5	118
Skill (problem solving & critical thinking)	52	8	5	65
Skill (social)	13	0	4	17
Skill (teaching)	6	0	2	8
Skill (design)	3	0	1	4
Skill (computer)	0	0	1	1
Skill (total of all types)	523	46	107	677

Number of different types of skills referred to in articles=>34.

Analysis of 2,073 references in the *JTE* supports the findings included in Tables 7 and 8 (Table 10). Science appears in 227 author, title, or publisher names; this is over 17 times more than the number of references containing art. Design appears in one-half of the number of references to science and provided a substantial content in the text (Table 8). Given that over 25% of these references had "design and technology" in the titles, this may be an indication of the interests of the international authors in the *JTE*. The names of seven of the most often cited theorists in education *and* STS journals between 1986 and 1997 were also searched in the *JTE* references. Yet as indicated, the work of these theorists has been utilized by only one or two *JTE* authors. UNESCO publications were used only four times in the 2,073 references, which reinforces the notion that cooperation between nations is not a concern as reflected in the *JTE*.

Table 10
Analytical Units of Substance in References

Unit	Frequency (All References)
Science	227
Design	111
Math	58
Art	13
Dewey, John	13
UNESCO (United Nations)	4
Marx (-ist/ism)	3
Apple, Michael	3
Foucault, Michel	2
Giroux, Henry	1
Haraway, Donna	2
Harding, Sandra	2
Lave, Jean	2
Latour, Bruno	0

The authors that have been cited 20 or more times and used to inform *JTE* research are technology educators (Table 11). This is *not* necessarily as it should be. Savage & Sterry's *Conceptual Framework for Technology Education* appears to be an obligatory passage point for the U.S. authors studying curriculum. The international author most commonly cited was Robert McCormick who received 12 citations. The only real surprise here was the number of times Bonser and Mossman appeared in the references. This is a reflection of the revival that historical research has had over the past four volumes in the *JTE*, apparently spearheaded by Patrick Foster.

Of course, citation and utilization of scholarly work can be political, and one gets a sense of this in a recent yearbook of the Council on Technology Teacher Education. Just one of the 852 references made in the *Foundations of Technology Education*, a 639 page survey of recent curriculum and institutional changes in the U.S., is to Karen Zuga. However relevant to the "foundations"

conversation, her work in curriculum, gender, and history was evidently bypassed for less critical texts (Petrina, 1998a).

The Technology Teacher (*TTT*) and its earlier moniker *Man/Society/ Technology* were counted nearly twice as many times as the next popular journal, the *JTE*. They were counted more than three times as often as two other research journals related to technology education, the *Journal of Industrial Teacher Education* (*JITE*) and the *Journal of Technology Studies* and its earlier moniker, the *Journal of Epsilon Pi Tau*. The duration of time over which *TTT* was published explains a part of this popularity. Although the *International Journal of Technology and Design Education* has been published since 1990, it appears only three times in *JTE* references. This is surprising, considering that 16% of the *JTE*'s authors are from countries other than the U.S. Journals in general education were also referenced only a few times. For instance, the *Educational Researcher* was counted seven times, *Harvard Educational Review* three times, *Journal of Educational Research* six times, and the *Teachers College Record* was counted only twice in its post-1930s form. This lack of engagement with the larger educational research enterprise is characteristic of technology education as a whole (Petrina, in press)(see Table 12).

Table 11
Authors Cited in References 19 or More Times

Author	Frequency (All References)
Bonser, Frederick	22*
DeVore, Paul	20
Maley, Donald	23
Mossman, Lois	19*
Savage, Ernest & Sterry, Leonard	22
Wright, R. Thomas	21
Zuga, Karen	22

The Politics of Data - The Data of Politics

In the preceding content analysis, a variety of problematic issues were pointed out which are manifested in a number of problematic discourses shaping the epistemological enterprise of technology education. That analysis was basically descriptive as it dealt with empirical indications of manifest content, yet it enabled us to penetrate the contents of the *JTE* for latent meanings and explanation. If these contents and meanings are to be understood in larger (con)texts and on qualitative terms, further interrogation of discourses is necessary. In the following sections, the *JTE* will be critically interpreted as a text where discourses and distortions circulate and mediate among individual authors and their cultural contexts.

In the inaugural issue of the *JTE*, the lead article articulated and generated an uncritical, conservative discourse of progress from a crude era of industrial arts to a refined era of technology education. In this article are most of the logics of a discourse that tie many of the *JTE* articles together over the first eight volumes. Clark (1989) argued that industrial arts was in a paradigmatic crisis

(c.f., Petrina, 1994). He placed the locus of his "crisis" in the public schools, distorted history, and practice to fabricate a gaping distance between industrial and technology education, and aligned the latter with an economic agenda of American competitive supremacy in a global market (pp. 9,11,13). For Clark, professional progress would not be judged from a perspective of the representation of maligned or marginalized groups. It was incontestable that white men would continue to be in control. At about the same time in 1989, the ITEA published *Technology: A National Imperative*, which articulated the same discourse - a discourse that already had over five years of momentum in education, fueled by conservative American politics (Hlebowitsh & Wraga, 1989; Shea, Kahane and Sola, 1989).

Table 12
Technology Education Journals Cited in References

Journal	Frequency (All References)
The Technology Teacher	78
Journal of Technology Education	47
Journal of Industrial Teacher Education	29
Journal of Epsilon Pi Tau	12
School Shop	12
Journal of Technology Studies	10
Man/Society/Technology	11
TIES Magazine	6
Industrial Education	5
International Journal of Technology And Design Education	3
Journal of Vocational Education Research	2
Journal of Technology and Society	1
Innovations in Science and Technology Education	1
Journal of Design and Technology Education	0

This discourse was circulated through the *JTE* in a variety of ways from the explicit to the subtle. Authors of conceptual articles such as Johnson (1991) and Baker, Boser & Householder (1992) explicitly articulated this conservative, economic discourse. Economic concerns were explicitly mentioned 162 times in the *JTE*. This discourse, serving an ideological function for a majority of authors, was naturalized through the 1990s - it went unquestioned for these authors (Petrina, 1998). For example, in some articles in the *JTE*, "technological literacy" and "math-science-technology" can be read as unquestioned codes for American economic supremacy (e.g., Satchwell & Dugger, 1996). Johnson (1991) and Baker, Boser & Householder (1992) conflate technological literacy and knowledge in math and science with economic supremacy, as does the recent Technology for All Americans project (Dugger, 1995, p. 14). The naturalization of this discourse helped make a preoccupation with science appear natural and pedagogical, rather than economic or a brokerage of power. Science

and its derivatives were given 1,215 references in the *JTE* text, industry's needs were mentioned about 272 times, and the necessities of business 70 times. Competition among nations, mostly on terms of U.S. economic supremacy, was mentioned 39 times, whereas cooperation was not mentioned at all.

As suggested by the content analysis data, it is as important to pay attention to what is *not* said as it is to what *is* said. The missing demographic data of the subject-centered research can be read as an approval of, or capitulation toward, gross inequities in technology education. The missing analytical discussions of class, gender, labor, and race can be read as the same.

Research, which was postured as objective, through its uncritical conceptualization is complicit with this conservatism. For example, Paige & Wolansky's (1990) survey of all chairs and heads of departments that offer degrees in industrial and technology education does not mention equity. One wonders if even one respondent was a woman or person of color since the demographics were not provided. Attention to equity was not included as an administrative task of these chairs and heads. In the sample of 104, less than ten would have represented a visible minority group; and, the researchers had to be aware of this before their survey. By declining to confront equity as an issue, and by avoiding a reflexive turn on their sources, these researchers infer from white men a knowledge for all men and women. In effect, they helped to perpetuate an inequitable system and *status quo* power. In the same volume, the survey research of DeLuca (1991), Householder & Boser (1991), and Smallwood (1991) falls prey to the same fallacy and complicity without bracketing the biases of their subjects. This uncritical inferencing from a uniform demographic, or a biased sample, can be found in the survey and Delphi studies across eight years of the *JTE*.

The one experimental study and seven of the eight quasi-experimental designs exhibit the same fallacy (e.g., Childress, 1996; Dugger & Meier, 1994; Haynie, 1994). Wu, Custer & Dyrenfurth (1996) helpfully identified the age and sex distribution of their experimental sample, but did not indicate the racial demographics or bracket their sampling biases. The experimental researchers fail to attend to a fundamental principle of this type of research: "Any sampling bias present in a study should be fully described in the final research report" (Gay, 1981, p. 102). Without the acknowledgment that the sampling in these studies is not robust enough for parametric statistics and inference, this is either simply bad research or inadequate reporting. They also do not acknowledge the most basic importance of the interactions among socio-economic status, gender, race, and educational achievement. Without this knowledge, there is little power - or sociological reason - for interpretation. Despite Haynie's lament over the "meager" percentage of experimental studies in the *JTE*, all but one of those that have been published appear extremely flawed by design or report (Haynie, 1998, p. 79). Without bracketing gender, socio-economics, and race in their design, experimental researchers in the *JTE* come across as complacent and their inferences or recommendations as suspect.

The apparent systematic exclusion of visible minorities from subject-oriented research is central to the maintenance of *status quo* power and conservative whiteness in technology education. The samples used in survey and

experimental research are evidently *not* representative of the demographics of student or teacher populations. What this means is that knowledge normed to a uniform sample can only inform a similar uniform sample or population. There is an indication of, for the sake of administrative convenience, an interest in sampling white men and white, male students. This knowledge is generalizable only to groups of young or adult white men. Yet in 74% of the 34 studies using human subjects, the readers were to assume that demographics are unimportant, and that knowledge can be reduced universally by sampling white men. These interests as they are shaped through a conservative discourse could be shrugged off as irrelevant lest for the fact that they were not confronted - they were not countered by a critical cultural, ecological, or social sensibility.

Concerns typically associated with critical workers in education - class, ecology, gender, labor, race, and sexuality - were conspicuously absent against this conservative discourse. Class was not problematized outside of Hansen's (1996) conceptual study, and racial equity was an issue only for Jeria and Roth (1992) and in O'Riley's critical discourse analysis. Only in O'Riley's (1996) work was race grounded in post-colonial theory and gender made problematic through feminist theory. Labor was mentioned just four times outside of Lakes' (1990) conceptual article. Critical social science theorists - Apple, Foucault, Giroux, Haraway, Harding, Lave and Latour - were rarely, if at all used. Ecology was mentioned only six times in eight volumes of the *JTE*. The critical, ecological discourse of researchers such as McLaughlin (1995, 1996) and Elshof (1998) have yet to be represented in the *JTE* as counter to the globalizing, economic discourse. Queer theory and issues of sexuality have not been brought into the critical discourse of the *JTE*. Technology education is not a project of equity, justice, and tranquillity as represented by most authors in the *JTE*. Although the social science methods which can ground these concerns, as well as the theorists which inform them, are under-represented, there is a critical discourse to acknowledge in the *JTE*.

The critical discourse in the *JTE* circulated in contra-distinction to the conservative discourse. In the same inaugural issue that Clark (1989) kicked off conservatism, Zuga (1989) initiated a critical discourse on curriculum. Through content analysis and attention to discourse and texts, she provided evidence of the dominance of a technical, or conservative, curriculum design model in technology education. In so doing, she pointed out the inherent contradictions of curriculum in a larger context of practice in teacher education. Contrary to conventional wisdom she argued, there were alternatives to technical models - there was no "one best way" of curriculum development and organization. While she has been arguing for an acknowledgment of this in the preparation of teachers since the late 80s, her work has not been understood by those who she contradicted (Petrina, in press). This critical discourse on curriculum was reinforced at a different level in the *JTE* in her 1991 survey research, and in other places (Zuga, 1993, 1994, 1996).

Later articulations of a critical discourse in the *JTE* are indebted to Zuga's work. Pannabecker's (1991) discourse analysis was a critique of the over-utilization of an "impact" metaphor and deterministic thinking by technology

educators. My response to this was the first step to dialogue through the "reaction" section of the *JTE*, but suffered for a lack of a framework more firmly grounded in Marxist theory and cultural studies (Petrina, 1992). A second dialogic article, in response to Thomas Wright (1992), picked up on Zuga's critical work in curriculum, but failed to provide a strong theoretical critique of disciplinarity (Petrina, 1993a, c.f., Petrina, 1998). A third focused on the conservative, corporate influence that had taken hold of curriculum through "modules," but did not take the next step to clearly demonstrate how this control was racist, sexist, and anti-labor (Petrina, 1993b). These three articles, and Pannabecker's critique, failed to adequately address, and ground theoretically the inequities of class, gender, labor, and race. Similarly, while Volk's (1993, 1997) critical analyses of teacher education enrollments implicated industrial technology in a decline of programs, he failed to adequately respond to inequity in the history of those programs.

Foster (1994, 1995a, 1995b) ushered a critical, historical discourse into the *JTE*, and resituated contemporary, ahistorical notions of technology education in their early 20th century contexts. Drawing from arguments made by Zuga, he argued for the acknowledgment of women's work that shaped the direction of technology education. He was able to weave the maligned work of Lois Coffey Mossman back into the fabric of technology education. His study (1995b) should have been cast in a larger context of the marginalization of women in the U.S. during the 20th century. If informed through a sociology of professions, his work could link up much more forcefully with current inequities.

O'Riley's (1996) work demonstrated how these socio-historical, gendered, and racial structures are manifested in today's curriculum practices. She used a critique of the normalizing, universalizing efforts of the Technology For All Americans project to get her point across. Similar to Zuga, she pointed out constructive and sustainable alternatives to these curriculum enterprises. Feminist, post-colonial, and post-structural theory helped her get an effective, analytical purchase on her data. Her work could have been extended toward a critique of the class biases also inherent in projects like Technology For All Americans.

When we weigh the evidence, there has not been a critical mass to counter balance the conservative discourse of the *JTE* which is heavily reinforced by the profession. It is true that a bit of critical discourse goes a long way in this profession, but progress is often overshadowed by a wave of backlash. In a context of the politics of research and vision, toward whom ought we turn for direction into the future of the *JTE* and the research enterprise of technology education?

Whose Agenda?—Who's Paying Attention to What?

As indicated in the preceding sections, there is a political dimension to research that technology educators have not readily acknowledged. A cognizance of the politics of contents and discourses circulating through the research enterprise of technology education is necessary for normative action. Yet generally those who have attempted to direct research have not positioned technology education in the larger nexus of the politics of education and

technology. Most have been narrowly fixated on effects (i.e., What effect is technology education having on employment, test scores, students, and the state?) They have been fixated on proof and in this way, on a positivistic fallacy that somehow key studies will persuade some decision-maker to support some method or program. Of course, the politics of technology education are not this simple. These research directions have been shaped through the same causal mentalities that shape the main of directions for vocational educators (Griggs, 1990). At the same time, researchers in technology education have isolated themselves from the main currents in education and the social sciences (Petrina, 1998a). This isolation has been physical as well as ideological and has been historically conditioned over the past 80 years in the U.S. So what ought we do to (re)direct research in this profession?

A number of researchers or groups of researchers have addressed this question during the 1990s at the macro-level or *episteme* (Foster, 1992; Olson & Hansen, 1994; Zuga, 1994) or the micro-level of thematic reviews (e.g., Jones, 1997; Lewis, Petrina & Hill, in press; LaPorte & Sanders, 1995). My estimation that the entire *episteme* of technology education is problematic concurs with Zuga. At least seven researchers or groups had ventured during the 1990s to give parameters and direction to research in technology education.

Their research agendas or recommendations are considerable. Lewis' (1990) model was intended for vocational educators but has relevance for technology educators. Lewis suggested studies be situated among three areas: (1) program justification, philosophy, and design; (2) milieu or ethos (e.g., curriculum & pedagogy); and (3) impact assessment (e.g., clientele's life experiences). Waetjen (1991) suggested technology educators' research agenda involve studies of: (1) behavioral changes in students; (2) teaching; and (3) the political, decision making environment. A group working out of Leeds University indicated four central areas of an agenda (Anning, et al., 1991): (1) conceptualization and realization of technology education; (2) students' competence in and attitudes to technological studies; (3) training of teachers of technology; and (4) policy studies. Zuga (1994) recommended technology educators' research focus on: (1) the inherent value of technology education; (2) cognition and conceptual attainment; (3) ideology and biases of practice; (4) public attitudes toward technology education; (5) evaluation of curriculum materials and development; and (6) effectiveness in professional development. Wicklein (1993) and Wicklein & Hill (1996) recommend four areas for research: (1) curriculum development; (2) public relations and positioning; (3) perceptions of teachers; and (4) integration with other subjects. Foster (1996) suggested that a research agenda consist of: (1) integration with other subjects; (2) the role of technology education; (3) rationale; (4) technological literacy; (5) technological "impact;" and (6) evaluation of instructional effectiveness. Finally, Hansen (1996) suggests four areas and focus questions for a research agenda: (1) technological education as a field of study (Is the field well conceived?); (2) cultural centrality of technology (How central are cultural and social phenomena to the technology curriculum?); (3) learning and technology (How do people

learn the components of technological achievement?); and (4) theoretical frameworks (How can research on curriculum and schooling be optimized?).

These agendas, models, and recommendations are short-sighted on one or several counts. Most significantly, not one of these provide a grounding in the politics of research or an indication of *how* research is to be done. On this latter issue, K. H. Hansen (1995, p. 42) and Zuga (1994) argue that research ought to be expanded from instrumental approaches to include those that are critical and emancipatory. Given that the question of *how* research has been done is a major, epistemological site uncovered in this article, we need to expand on the contentions of Zuga and Hansen. A second point is that these agendas, models, and recommendations are more comprehensive than others, but all are less comprehensive than is necessary for direction. A third point is the ideological function of them. It is clear that not all see the same end of research, nor are similar problems seen in the same light; indeed, not all construct an agenda with the same agenda. A proactive and responsive vision spelled out in the next section is nonetheless indebted to those who have ventured to reform the research enterprise of technology education.

A *fin de millenium* Research Vision for Technology Education

If technology education is to have substance and inform educational practice outside of its field, researchers are going to have to reconsider their work and its immediate context in the politics of research practice. For this to occur, research problems, methods, and theory will have to be re-centered within education and science and technology studies (STS). To be relevant to education and STS, research will have to have a distinct theoretical component and be cast within particular areas of research practice.

Informed through this analysis of the politics of research in the *JTE* and a review of existing research agendas, the following "research vision" is intended to give shape and direction to a problematic enterprise (Donmoyer, 1997, p. 2). Research areas of engagement are listed below each central framing question to indicate how a question may be approached for study. Each research area has a grounding in education and the social sciences, which includes methods and theories for inquiry. Research ought to be shaped to inform one or several central framing questions and be situated within one or several areas of engagement. This meta-study of research for instance, informs questions I, II, III, and VII, and is situated in the axiology, epistemology, and politics of technology education.

Research Areas of Engagement

- Anthropology and Sociology of Technology Education
- Axiology and Epistemology of Technology Education
- Comparative Studies of Technology Education
- Cultural and Social Psychology (including Learning Theory) of Technology Education
- Curriculum and Pedagogy (including Critical and Eco-Pedagogy) in Technology Education
- Design, Cultural, Labor, Technology, or Workplace Studies

- Economics and Politics of Technology Education
- Genealogy, History and Historiography of Technology Education
- Organizations and Micropolitics in Technology Education

Central Framing Questions

I. How do I, students, teachers, teacher educators, and the general public come to practice, use, *and* understand education *and* technology? What and how do we and they know?
   - Anthropology and Sociology of Technology Education
   - Axiology and Epistemology of Technology Education
   - Comparative Studies of Technology Education
   - Cultural and Social Psychology (including Learning Theory) of Technology Education
   - Curriculum and Pedagogy (including Critical and Eco-Pedagogy) in Technology Education
   - Design, Cultural, Labor, Technology, or Workplace Studies
   - Economics and Politics of Technology Education

II. Toward what end are we committing technology education? Whose end and why? What means have we chosen to move us in that direction? Should we be heading in that direction?
   - Anthropology and Sociology of Technology Education
   - Axiology and Epistemology of Technology Education
   - Economics and Politics of Technology Education
   - Genealogy, History and Historiography of Technology Education

III. What is and ought to be the nature of knowledge in technology education?
   - Anthropology and Sociology of Technology Education
   - Axiology and Epistemology of Technology Education
   - Cultural and Social Psychology (including Learning Theory) of Technology Education
   - Economics and Politics of Technology Education
   - Design, Cultural, Labor, Technology, or Workplace Studies
   - Curriculum and Pedagogy (including Critical and Eco-Pedagogy) in Technology Education

IV. How should this knowledge be organized, what ought to be selected for teaching, how should it be taught, and for what end?
   - Anthropology and Sociology of Technology Education
   - Axiology and Epistemology of Technology Education
   - Comparative Studies and Anthropology of Technology Education
   - Cultural and Social Psychology (including Learning Theory) of Technology Education
   - Curriculum and Pedagogy (including Critical and Eco-Pedagogy) in Technology Education

V. How was technology education practiced in the past? Who said so, and how does that link up to current power structures and values?
   - Anthropology and Sociology of Technology Education
   - Genealogy, History and Historiography of Technology Education
   - Comparative Studies of Technology Education

VI. How is or was technology education practiced in subcultures and in other cultures? Who says so, and how does that link up to current power structures and values?
   - Anthropology and Sociology of Technology Education
   - Comparative Studies of Technology Education
   - Genealogy, History and Historiography of Technology Education

VII. Who participates in technology education and why or why not? What has been or ought to be done to change this?
   - Anthropology and Sociology of Technology Education
   - Curriculum and Pedagogy (including Critical and Eco-Pedagogy) in Technology Education
   - Cultural and Social Psychology (including Learning Theory) of Technology Education
   - Design, Cultural, Labor, Technology, or Workplace Studies
   - Economics and Politics of Technology Education
   - Organizations and Micropolitics in Technology Education

For example, the question "Who participates in technology education and why or why not?" can be informed through a number of different areas of engagement. One may be curious about gender and race at the organizational level of technology education. The ITEA's Board of Directors, which is a decision-making and policy arm of this Association, has been controlled for the past three years by a board of twelve men. Every "Teacher Educator of the Year" award given by the CTTE and ITEA for the past 44 years has gone to a white man. Two of the 71 editors of CTTE yearbooks published over the last 46 years were women. This particular question of participation can be best informed by engaging with the area of research in organizations and micro-politics of education (Bacharach & Mundell, 1993; Hoyle, 1985). Gender and racial equity theory used in context of organizational and micropolitical theory would help ground the question. These theories problematize gender and race while providing a powerful base through which to gain an understanding of the question of participation and the politics of representation. By situating in the research practices of education and the social sciences, researchers necessarily situate themselves in a theoretical landscape - a historical and socio-political terrain where the currency is relevance and engagement with the turbulent epistemology of the day.

Final Analysis: Speaking Out Against 'the Man'

> All too often, on the long road up, young leaders become servants of what is rather than shapers of what might be. In the long process of learning how the system works, they are rewarded for playing within the intricate structure of existing rules. By the time they reach the top, they are likely to be trained prisoners of the structure. . . .But no system can stay vital for long unless some of its leaders remain sufficiently independent to help it to change and grow. (John Gardner, 1986, p. 25)

In the final analysis, the *JTE* comes across as a text where conservative voices are favored and critical voices the exception. In this regard, the *JTE* is representative of the *episteme* of technology education. Where discourses and distortions of American supremacy, disciplinary subjugation, and scientific elitism are prevalent, there are few discourses that run counter to these. Yet the *JTE* has supported a critical discourse that cannot be found in any of the other technology education media. Given their record, the position of Mark Sanders and James LaPorte should be acknowledged. They will publish critical work if authors place manuscripts in their hands.

Why are not more than a few authors interrogating class, ecology, gender, labor, race, or sexuality in a context of this profession? Most researchers publishing in the *JTE* do not bring an internal criticism to their work; reflexive practice is not demonstrated. While discourses circulate among *JTE* issues and across volumes, there is very little dialogue among the authors. The isolation of technology education researchers from each other and from education and the social sciences has to be overcome. For example, at annual American Educational Research Association meetings, there have been few, if any, technology educators from the U.S. present over the past 6 years. Graduate students are facing a much different educational culture than did most of their advisors, and have to necessarily engage with the issues pointed out in this analysis. Those of us who do critical pedagogy and studies know the politics of recognition all too well - and the backlash that results from publicly speaking out. As indicated by the citations in the 1995 CTTE yearbook, there is an unhealthy politics of what and whose work gets read, referenced, published, and used (Petrina, in press). What is and what is not a significant issue to address in research, or what is progress, has generally been in the hands of ITEA policy-makers and *not* independent researchers. Still, it can be said: "We have met the enemy and he and she is us."

My contention is that if we are to move this *episteme* out of a conservative quagmire, we have to pay close attention to the politics of data, methods, subjects, theories, and epistemological visions. Editors and reviewers of book and journal manuscripts in technology education will have to be much more aggressive, proactive, and vigilant in shaping the research enterprise of technology education. Whereas Sanders was confronted with the challenge of establishing the *JTE* as a scholarly journal, his successor, LaPorte, should tackle the issues of representation and scholarly dialogue. LaPorte ought to encourage dialogue and a counter to the conservatism which is dominant in the profession

of technology education. *JTE* discourse can be improved by reaching out to under-represented groups and marginalized voices. Unlike Sanders, he should use the "From the Editor" space to attend to inequities in technology education. Karen Zuga, beginning a tenure as Editor of the *JITE,* is facing similar challenges.

Would a more balanced demographic of reviewers make a difference in what and whose concerns and views are represented in the *JTE*? For example, until volume eight, the *JTE* had either one or two women reviewers appointed to an Editorial Board of 15 to 17 people, depending on the issue. Chances were good that a manuscript was accepted without ever having been reviewed by a woman (or a person of color). Although the current *JTE* board has four women, we should not assume that it is the task of women to attend to issues of gender and representation. For systemic change, all reviewers will have to be vigilant in attending to demographic sampling and a neglect of underrepresented groups and ideas in *JTE* manuscripts. Regardless of the current population of reviewers, teachers, and teacher educators in technology education, it seems essential that we practice with the interests and voices of underrepresented groups in mind.

It may be presumptuous to call for a moratorium on publishing any research that conceals the demographics of subjects or sites and feigns normality, does not reflect a reflexive turn toward internal criticism, or research that does not engage with theoretical issues of education and social science. But what is to be lost by calling for a moratorium? This profession can and should be different. Inequities (re)produced and strengthened over the past decade might begin to dissolve if researchers gain the courage to confront them instead of acting as "servants" or "prisoners" of the system (Gardner, 1989, p. 25).

The politics of research in technology education may be reduced to two questions for dialogue. Can the *JTE* be shaped to become less a product of its profession and more an intervening model of force for positive, systemic change? And, is the *episteme* and minority demographic of technology education best served by uncritical, insular research, or by critical, outward-looking studies?

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