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ABSTRACT

The influence of a technocratic ideology in industrial arts education was examined through a critical study of a curriculum revision project. Qualitative methods of investigation were used to analyze and critique the curriculum revision process and product. Primary emphasis was on the curriculum meetings held to discuss and plan changes in industrial arts education. Transcribed comments of participants and information gathered through interviews, documents, and field notes were categorized. The study became focused on the influences of the predominant ideology, and categories that were created were compared with the aspects of technocratic ideology. Constructs of technocratic ideology as defined by Bowers--mechanisticity, reproducibility, measurability, componentiality, problem-solving inventiveness, and self-anonymization--were related to results of the curriculum revision. The teachers' technical background and mode of operating combined with the rational curriculum revision had an influence on the curriculum revision--an influence that may emanate from a technocratic ideology with roots in the history of industrial arts education. Detrimental effects of technocratic ideology upon curriculum reconceptualization in industrial arts were identified: simplification of the subject, potential student alienation, and the reproduction of unequal class structures. The question of the ability to influence or change the ideological framework of teachers was raised. (YLB)

INDUSTRIAL ARTS REFORM: TRAPPED IN A TECHNOCRATIC IDEOLOGY

(Limitations Imposed By Ideology While Reconceptualizing Industrial Arts Curriculum)

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Abstract

An examination of the influence of a technocratic ideology in industrial arts education through a critical study of a curriculum revision project. Qualitative methods of investigation were used in order to analyze and critique the curriculum revision process and product.

Limitations imposed by history and practiced are discussed. Based upon Bowers' (1977) definition of technocratic ideology, mechanisticiy, reproducibility, measurability, componentiality, problem solving inventiveness, and self-anonymization are related to the results of the curriculum revision.

Detrimental effects of technocratic ideology upon curriculum reconceptualization in industrial arts are outlined. Those issues include: simplification of the subject, potential student alienation, and the reproduction of unequal class structures.

Finally, the question of the ability to influence or change the ideological framework of teachers is raised.

Industrial Arts Reform: Trapped in a Technocratic Ideology

Karen F. Zuga

Industrial arts education is grounded in a technocratic ideology. Throughout its history as a subject matter in the public schools both content and process have been influenced by technical models of content and curriculum design. As industrial arts educators seek to change the basic philosophy and practice of their field to a more open model of technology education, the basic beliefs and operational procedures of the past continue to haunt the transition. Their struggle to reconceptualize curriculum is not unique in education. However, the influence of creating a curriculum based upon technology and the historical influence of creating curriculum via a technical model provides strong opposition to curriculum change in the field.

Ideology can be understood at two basic levels. As a neutral concept, systems of thought, belief, and practices "which pertain to social action or political projects" (Thompson, 1984, p. 4) is a common view of ideology. As a critical concept, ideology is, "linked to the process of sustaining asymetrical relations of power--- that is, to the process of maintaining domination" (Thompson, 1984, p. 4). With respect to curriculum, a critical view of ideology implies,

> the concrete ways in which prevalent (and I would add, alienating) structural arrangements--- the basic ways institutions, people, and modes of production, distribution, and consumption are organized and controlled--- dominate cultural life. This includes day-to-day practices as schools and the teaching and curricula found within them (Apple, 1979, p. 2).

The technocratic ideology which influences industrial arts education is a part of the daily functioning of the members of the field. It embodies the mode in which content is approached and includes:

> <u>mechanisticity</u> (seeing the work process tied to the machine process), <u>reproducibility</u> (no action in the work process is unique but must be reproducible), <u>measurability</u> (the individual's activities can be evaluated in

> quantifiable terms), componentiality (everything is analyzed into constituent components that are seen as interdependent), problem solving inventiveness (a tinkering attitude toward areas of experience that can be dealt with in terms of technological solutions) and the self-anonymization of the worker (learning to divide the self into component parts, and to accept the human engineering process that organizes the self in terms of technological functions) (Bowers, 1977, p. 37).

Curriculum in industrial arts education is controlled by this technocratic ideology. It is revealed by the way in which teachers and curriculum theorists conceptualize content through an industrial processes approach and it is revealed by the dominant use of identifying content by task analysis. This leads to selecting and organizing processes or technical skills as curriculum content. Due to a long association with trade and industrial vocational education, a technical method of constructing curriculum, trade and job analysis, has permeated the thinking of industrial arts educators (Lux, 1979; Barella, 1981). The technocratic ideology is reinforced by the public schools through the use of specific competencies (Eisner and Vallance, 1974; Saylor, Alexander, and Lewis, 1981) curriculum models (Bowers, 1977; Schubert, 1986).

Statements which describe curriculum for industrial arts have always contradicted the technical emphasis of the field. Recent curriculum efforts in the field have attempted to move farther away from a technical model by stressing the study of the development of technology and its relationship to society via a problem centered approach (DeVore, 1980; International Technology Education Association, 1983). New textbooks and curriculum proposals utilize concepts of technology such as research and development, mass production, and quality control with an emphasis on the influence of these processes upon the student and society (Hacker & Barden, 1987). The goals for the curriculum often prescribe a critical approach to the study of technology education, but curriculum plans often bear little evidence of this effort.

During the course of the 1984-86 school years, the industrial arts teachers of a midwestern suburban school district, with the help of three local industrial education teacher educators and a school district curriculum supervisor, worked to revise the industrial arts curriculum in their schools. This is a critical analysis of their project. While many events, ideas, and relationships influenced the curriculum project, this study is focused on the technocratic ideology of the participants and the influence of that ideology on the curriculum.

Evidence Collection and Analysis

The primary emphasis of the study was on the curriculum meetings held to discuss and plan changes in industrial arts education. During the first year of the project the participants met weekly in order to create a new curriculum for industrial arts. I attended the meetings, audio taped them, took field notes, visited selected schools, interviewed participants, and collected all documents generated by the project team. The audio tapes were transcribed. During the second year of the project, implementation was initiated in the junior high schools of the district. I visited those schools, observing classes and interviewing teachers.

I used initial questions in order to focus the study. They were, 1) What ideas and concepts were discussed by teachers while debating curriculum? 2) What were the types and stages of discussion which took place during the curriculum planning? and 3) In what ways did the teachers educators influence this process? During the course of the study, questions one and three emerged as dominant with respect to the interpretation presented here. An observed difficulty with discussing curriculum goals and objectives (transcribed tapes reveal less than 10 percent of the teachers' comments directed at this activity) and the resulting mismatch of goals and curriculum plans provided the impetus to investigate and analyze the influence of the planning process on the curriculum. The focus on the planning process began an investigation of why that particular process was used and remains an enduring curriculum development process in industrial arts education.

Analysis of the information involved categorizing the transcribed comments of the participants and the information gathered through interviews, documents, and field notes. With tentative interpretations I focused the study on the influence of the predominant ideology and compared the categories I created with the aspects of technocratic ideology. Additional review of the literature, the development of the theme concerning the influence of ideology, and re-examination of the evidence added to the interpretations.

Reconstructing Curriculum: Evidence of the Study

During the year of curriculum meetings, several decisions were made by the teachers. With the guidance of the curriculum supervisor and the teacher educators, teachers voted on a name change for their subject matter and a change from a materials and processing content base to an industry and technology content base. Industrial arts was changed to industrial technology education and the traditional courses of woods, metals, drawing, etc. were grouped into production, communication, energy and power, and transportation. A new scope and sequence document was written, some new classroom activities were designed, and equipment and materials were ordered.

While this appears to be significant change, the reader is cautioned. The major shifts in philosophy which were included in the scope and sequence document did not appear in practice. Evidence of the failure of these ideas to take hold can be seen during later discussions when the curriculum supervisor reminded the teachers:

> *I think as I look at your goals and objectives before, you were all doing creative things, but your objective was to teach them (students) to use the band saw or how to use the coping saw. And that was the end of it. . . I think as we went through the first semester you developed a content base. You were saying ' Yeah, I think it's important that they know how to use a band saw, it's important that they know how to use a coping saw and the skills that go along with that, but in learning that, I want to give them a perspective of industry and technology. We just don't stop with the damn skill any more, we relate that skill and those materials and all those other things you recently dealt with to what's going on in a larger world. (2/26/85, Tape 2-2)*

The following chart is based upon the information presented in the scope and sequence, teacher discussions and interviews, and observations during the implementation year. Although the information is reduced, it provides a general overview of the curriculum change. In an attempt to get beyond the rhetoric of the documents and identify actual practice, the chart identifies surface and deep structure (Bussis, Chittenden, & Amarel, 1976).

Summary of Curriculum Change Comparing Before and After Implementation

	BEFORE	AFTER
Surface Structure:		
OUTCOMES	Projects or activities	Projects or activities
CURRICULUM BASE	Materials & Processes (woods, metals, drawing, electricity, small engines, graphics, etc.)	Industrial Technology (energy & power, communication transportation, production)
INSTRUCTION	Following teacher directions	Following teacher directions or completing assigned activity packages
Deep Structure:		
OUTCOMES	Knowledge of processes and applications (e. g. how to bend sheet metal, use a band saw)	Knowledge of processes and applications, more emphasis on new technologies (e. g. robotics, lasers, CAD/CAM)
CURRICULUM ORGANIZATION	Skills (e. g. performing industrial processes)	Skills (e. g. performing industrial processes, researching, designing, and developing)
INSTRUCTION	Following directions and plans to build projects	Following directions and plans to build projects, designing variations of assigned projects such as a sailboat or race car, completing activity packages and experiments

The evidence presented in this chart identifies a persistent problem concerning curriculum revision attempts. Often the changes are the most radical on the documentation of the change and not in the classroom (Orlosky & Smith, 1972). Observing practice in the junior high school classrooms and laboratories after the curriculum planning and during implementation reveals that the curriculum change consists of new skills and industrial processes being added to the existing curriculum in favor of some of the traditional skills. Reviewing the list of goals for the new curriculum points out the discrepancy between theory and practice. The goals were:

Prepare students to work with technical systems such as mechanics, electronics, optics, fuids, and thermal power.
Assist students in assessing and preparing for future careers and technical occupations.
Enhance student mastery of the basics through the application of math, science, social studies, communications, and computer literacy.
Develop student awareness and skill through the safe utilization of tools, materials, and equipment.
Provide students with a foundation in entrepreneurship, economics, and business relationships.
Assist students to become independent learners and problem solvers who possess life-long learning attitudes.
Establish beliefs and values based upon the impact of industry and technology and how it alters environments.
Explore and develop human potentials related to responsible work, leisure, and citizenship roles in a technological society. (Curriculum Information Packet, 1985)

Several of these goals were not addressed in the subsequent curriculum plans.

The chart also illustrates some of the ways in which the technocratic ideology of the teachers influences curricular and instructional decisions. Constructs of technocratic ideology as defined by Bowers (1977) can be seen in the way in which teachers approached the curriculum design. Those constructs are mechanisticity, reproducibility, measurability, componentiality, problem solving inventiveness, and self-anonymization.

Mechanisticity

Thinking about curriculum content in mechanistic ways is represented by the teachers' reliance upon skills as the means of defining and organizing curriculum. Evidence of the persistence of thinking about curriculum as a series of activities structured to teach skills is corroborated by teacher interviews during which teachers stated that they selected activities and projects based upon the desire to teach specific tool and machine skills. During discussions about selecting content for the identified industrial technology systems, teachers often referred to teaching skills. While discussing topics which should be added to a communication course, teachers would specify topics such as offset printing and airbrush illustration. The change from a materials and process curriculum base to a concepts of industry and technology base, such as teaching the value of quality control as a part of manufacturing or the various means of generating power and the influences of those means upon the environment as a part of the study of power and energy never materialized in the teachers' discussions about curriculum content.

In addition, the goals and objectives which were included in the new scope and sequence guide were predominantly skill oriented. A sample of objectives includes,

> *Energy and power: Students should be able to disassemble, repair, and reassemble a small gas engine.*
> *Energy and power: Students should be able to draw simple fluid power circuits to meet specified requirements.*
> *Transportation: Students should successfully progam and operate a robotic device to demonstrate the automated transfer of goods. (Scope and Sequence, 1985)*

Most of the goals and objectives are similar. In one form or another skills were the primary organizers for the curriculum, thereby tying the teaching process to the machine process.

Reproducibility

Reproducibility can be seen in the way in which the teachers designed activities for the students. All of the activities were designed for all of the students. None of the activities were truly unique to particular students and all of the activities were to be completed by all of the students. Variations that did exist in the activities were to be accomplished by a students' choice of design of a race car, a bridge, or a windmill propeller. This uniqueness was to be achieved with efficiency in mind; the race car was to be designed to be the fastest; the bridge was to be designed to hold the most weight; or the windmill propeller was to be designed to generate the most electricity.

Within the organization of daily lessons, students would be processed as if they were on an assembly line, each one getting the same treatment with limited customization. The activities and lessons were reproducible.

Measurability

Measurability surfaced in the discussions about creating behavioral objectives. The objectives were measurable and behavioral, reinforcing the mechanisticity of the curriculum Even when planning selected activities for the new curriculum, teachers, who were versed in the rules of writing behavioral objectives, always provided skill development objectives with clearly stated behaviors such as: *"And the behavioral objective is to develop the 3 major skills in instrument flying" (4/16/85, Tape 1-2).*

When the teacher educators reviewed the process of writing objectives, the teachers were well aware of the ways to write objectives. Their school system required using goals and behavioral objectives on the curriculum scope and sequence. However, measurability appeared to get in the way of content selection. The content to select was a difficulty. Several work sessions were devoted to writing objectives to fit with the new goals and content of the curriculum. Emphasis on the format of the objectives, to the exclusion of emphasis on content, can be seen in the following typical excerpt:

> *Teacher 1: It's measurable objectives that's, ah, write it down. Apply the safety procedures of electricity. Well, that's pretty hard to measure. If its a measurable objective you ought to be able to write it down and give the students a test to measure it. I can measure that, give them a problem, I suppose... Yeah, yeah, explain the effects of electricity on the body:*
> *Teacher 2: Their, ah, ability to calculate...*
> *Teacher 1: Be able to make calculations, now that's something you can measure.*
> *Teacher 2: Yeah. They should be able to draw simple fluid power... that's something you can measure. You can draw it. Able to make calculations, that's something you can measure. Give them some problems. (looking through textbook) Give them 2 or 3. This one's hard to measure. That's hard. You should have, be able to compute, do some, conduct some energy, be aware of the quantity, well, that would just lead them back in here.*
> *Teacher 1: These have to be measurable. Now, we have an item like the one they've got here. The old one I'm using, 'The student will be able to explain the effects of electricity on and through the human body.' Well I'm putting down any amount they calculate. Now there you've got measurable. You have to calculate amperes, okay, and volts. (3/12/85, Tape 2-1)*

The form of the curriculum scope and sequence used by the school district and the explanation given by the industrial education teacher educators added to the teachers' technical approach to curriculum design, providing greater justification for skill instruction and measurability in the curriculum.

Componentiality

The way in which teachers conceived their curriculum is evidence of their view of the interdependence of elements or the componentiality of the curriculum. Matrices were used to analyze the components of industrial technology and to break down the components of each of the areas of communication, production, transportation, and energy and power. The production matrix appeared in the final documents as:

PRODUCTION . . . A technical system designed to utilize resources efficiently for the production and service of durable goods.

APPLICATION

	MANUFACTURING	CONSTRUCTION	MAINTENANCE	SERVICE
NEED/IDEA				
ORGANIZED PLAN				
DETERMINE/SELECT RAW MATERIALS				
COMBINE RAW MATERIALS AND OPERATIONS				
EVALUATE RESULTS				

(Scope and Sequence, 1985)

Activities were selected and located within the matrices. Although they may have overlapped, no discussion was held about the relationships and how those relationships might be made understandable to students. Although the matrices were designed to demonstrate the interdependence of the parts, the relationship of those parts in the curriculum which the students will experience was not clear.

Problem Solving Inventiveness

Industrial arts teachers tend to be "technonuts". They enjoy learning about new technical processes, creating products, and working with tools and materials. This is evident in their desire to learn more about technology. Most of the teachers who participated in this curriculum project were experienced and had an extensive background of graduate, technical, and vocational courses in addition to the general courses an undergraduate industrial arts education degree would include. These experiences enabled them to deal with technical problems. The belief and information expressed by this teacher is representative of the beliefs and background of most of the participants:

> *Now I know I could build a robot, and I could build a good one. And I could program that thing, but I don't see the opportunity sitting there. And that frustrates the hell out of me. Because I've got 120 hours over a Master's Degree and I've made--- I've gone out of my way to go to electronics classes--- the district didn't pay me for it. (4/16/85, Tape 1-1)*

There are about one quarter of the behavioral objectives which deal with the ability to research, design, and develop. In practice these are often interpreted as problem solving activities such as designing a propeller which is more efficient or a boat hull and sail which is faster. These problems deal with technical solutions to technical problems and they do not involve making decisions about our technological future. They become variations on the skill theme, and not problems which deal with our ability to control the way in which we use technology for the benefit of humans.

The teachers who participated in this project were experienced, none of them had taught for less than ten years; several of them were close to retirement. Most of the teachers had acquired not only teaching experience and advanced education degrees, but also advanced technical course work through post secondary vocational schools, industry sponsored workshops, and university sponsored technical workshops. In addition to the influence of the curriculum format required by the district and the curriculum revision process guided by the industrial education teachers, the internal beliefs and experience of the teachers began to merge into a technocratic ideology which permeated the curriculum revision process. For example, problem solving objectives were written, but they were technical problems.

Self-anonymization

Throughout the designing of the curriculum and the discussion of the activities the groundwork for self-anonymization within the curriculum was laid. Students were mentioned infrequently and the structure of the model of curriculm took over the process. Activities were designed to fit the model. The definitions of the areas were largely technical. The teachers were giving clear signals that they perceived their role as teaching skill development. Even discussions about budgets revealed this belief.

> *I'm fighting every time I want to buy a little tool, or a little nut, or a little bolt, or buy some piece of technology that we need in the development of skills. (4/16/85, Tape 1-1)*

Students did not come into the discussions about curriculum once the process of identifying and delineating content began. They became subject to the plan as anonymous participants in the project.

During the curriculum meetings, many things were not fully addressed. The personal beliefs of the teachers about the purpose of their field and the curriculum change process was one. In an effort not to influence teachers' beliefs with their own conceptualizations of industrial arts educational practice, the teacher educators tended to avoid topics concerned with the philosophy of industrial arts. Without the discussions about beliefs, the curriculum revision process itself became a technical exercise. The process used to implement the curriculum change was determined by the teacher educators and the requirements of the school district. As a method of writing curriculum plans, this method was never challenged. Specific challenges to the process came in the form of debates over how to format lesson plans for all of the schools rather than the effects of preselected behavioral objectives on the selection of curriculum content. Personal beliefs about students and the value of the subject matter were not addressed.

Hidden Ideology

Unquestioned assumptions guided the curriculum planning process. Those assumptions were that the method of planning was rational and it involved completing a needs assessment, identifying a content base, writing new goals and objectives, creating exemplary classroom and laboratory activities, selecting appropriate equipment and materials, and implementing changes. This method failed to produce a significant change in practice.

The teachers' technical background and mode of operating combined with the rational curriculum revision process influenced curriculum revision. This influence may eminate from a technocratic ideology which has its roots in the history of industrial arts education.

The Tradition of the Technocratic Ideology in Idustrial Arts Education

Perhaps more than most subject matter fields in general education, industrial arts educators have been influenced by a technocratic ideology. Acceptance of industrial arts as a school subject became popular during the early part of the century when social efficiency was a prevalent force in education. Task analysis and trade and job analysis have roots in the ideology of social efficiency. The description of the influence of the ideology of social efficiency in education identified by Callahan (1962) can be seen as a forerunner to Bowers' (1977) thoughts on technocratic ideology. More recently, Wirth (1983) has identified the influence of social efficiency as a limitation in the conceptualization of both work and education, specifically vocational education. Although the task analysis curriculum planning processes born by social efficiency do have a purpose and have been successful in some applications, the primary point here is that the process is limited and not supportive of the wider goals and responsibilities of general education, which industrial arts and technology educators claim to represent.

Early pioneers in industrial arts education aligned themselves with those who interpreted the purpose of the curriculum as social reconstruction as opposed to vocational educators who interpreted the purpose of the curriculum as social control (Herschbach, McPherson, & Latimer, 1982). Yet, industrial arts educators have often had a close alliance with trade and industrial educators and, perhaps, more important relationships with industrialists.

The association of industrial arts educators with trade and industrial vocational educators through a grouping into industrial education has provided the structure which permits the combining of textbooks, courses, and students of curriculum development. This association, which has been present since the beginning of industrial arts education for general education purposes, has spawned a practice of implementing prescriptive curriculum theory designed for vocational education while touting a descriptive curriculum theory of industrial arts education designed for general education. Essentially, industrial arts educators tend to quote Dewey (1916, 1938) about the goals and purposes of the field and implement curriculum based upon the designs of Bobbitt (1918) and Allen (1919).

Task analysis, or more specifically, trade and job analysis, has been a dominant mode of curriculum planning in industrial arts education. Bobbitt's (1918) early curriculum textbook examines trade and job analysis techniques of early industrial educators and reminds us of the pervasive influence of vocational educators upon all of education. In his text he provides examples of the techniques industrial educators used to generate curriculum content and the techniques he recommends for all educators closely resemble the technical planning of those industrial educators. These methods have been successful for teaching occupations and technical methods of curriculum planning are emphasized today in industrial/vocational education by educators such as Mager and Beach (1967).

Vocational educators such as Allen (1919), Selvidge (1923), and Fryklund (1956) and a host of others have been consistent in their prescriptions for designing trade and industry industrial education. They have persisted with the basics of task analysis, identifying the job to be learned, categorizing the skills to be performed on the job, and teaching those skills. While this method is successful for industrial education, it has been recommended, consistently, by the same authors and others, as a suitable method of identifying curriculum for industrial arts (Selvidge & Fryklund, 1946; Fryklund, 1956). Industrial arts education was often explained by these educators as similar to trade and industry education with an increased emphasis on individual projects and reports. Although many objected to using trade and job analysis techniques to identify curriculum content for industrial arts education, their failure to provide direction about how to identify content has allowed the vestiges of trade and job analysis to persist by default.

Emphasis in the schools on accountability and skill development further reinforces and justifies identifying skill as content for industrial arts education. Bowers (1977) contends that technocratic ideology continues to appear in the schools in the form of accountability and competency-based instruction. Although industrial arts teachers may not apply the rigid trade and job analysis techniques, the pressure towards competency based education serves to reinforce the traditional trade and job analysis practices of industrial arts educators. This leads to a default reliance upon a technocratic ideology. The dominance of the method has not been broken.

Industrial arts educators have also maintained a close relationship with industrialists. That relationship involves not only seeking the support of industrialists for the teaching of industrial arts on the schools, but also learning from industrialists for the purpose of developing curriculum. Advisors and consultants from industry are commonly sought during curriculum revision projects, literature designed for industry is often reviewed and used as content, and teachers often take industry sponsored training programs in order to improve technical skills.

Through these kinds of relationships the ideology of industry enters into the curriculum of industrial arts education. Those who are involved in industry place a high priority upon skill training. This priority filters into the framework of thought about industrial arts purposes and goals by virtue of the association of industrial arts teachers and industrialists.

Industrial arts leaders have recently countered with a stronger descriptive philosophy and a suggested name change for the field from industrial arts to technology education. This move, as demonstrated in this one case, may not achieve the desired results. Without examining the underpinning ideology of the field, the technology education movement is in danger of becoming a sophisticated, "high" technology version of traditional industrial arts.

Total reliance upon a technocratic ideology is restrictive to the development of subject matter such as industrial arts. Presently, industrial arts teachers are being immersed in a technocratic ideology through their own professional practice, association with industrialists, literature in the field of industrial education, and the ideology of the administration of public schools. This, in turn, has influenced their ability to reconceptualize curriculum. This will also influence the ability of technology education, the newer version of industrial arts, to become truly a general education subject matter.

Contradictions When Trapped by Ideology

The findings of this study illustrate the contradictions which surface when teachers are trapped in an ideology. The new curriculum had specified goals such as "assisting students to become independent learners and problem solvers" and "establishing beliefs and values based upon the impact of industry and technology and how it alters environments." These goals appeared to be ignored during the subsequent planning. The technocratic ideology prevalent in the teachers' thinking prevented the examination of these goals and fundamental questions related to the purpose of the subject matter. In this case, the industrial arts teachers voted to become industrial technology teachers without examining the shift in personal philosophy that move would entail. As a result, the innovation sought through curriculum change became a modernization of the same approach to teaching industrial arts and not an innovation.

The entrapment in an ideology points to the need to examine the hidden values in curriculum planning. These hidden values not only influence the choice of content, but the way in which teachers make those choices and the influence of ideology upon those choices. In this case, an examination of the curriculum revision process as an issue was never done. More important, the assumptions of the curriculum planning process which may have been influenced by experiences with and relationships to vocational education and industry were never explored. While an analysis of the larger political framework which supports the practice of industrial arts educators may have been of interest to this point, this was not done either. Both the examination of the influence of a technocratic ideology and the examination of the larger economic and political framework which supports practice in the schools may have helped to redirect the thinking of the teachers and their conceptualization of industrial arts curriculum.

Do industrial arts teachers preserve and sustain unequal societal relationships through their ideology? From the evidence in this study they reproduce a technocratic ideology within their curriculum plans. Moreover, the context of that ideology is in an industry-like setting which closely parallels the operations of industry. Students are being taught the skills needed by industrial laborers and not the general knowledge, skills, and attitudes suited to all members of society. However, the teachers' reproduction of ideology is not conscious, nor is it in conflict with the actions of most educators (Apple, 1985; Willis, 1977; Bowles & Gintis, 1976). The contradiction, here, is in the desire and claim that the teachers exert when identifying themselves as general education and seeking to fulfil goals which would help students to develop critical and reflective thinking about industry.

The teachers who participated in this project face problems which face all teachers when trapped in a technical perspective. They risk the chance of simplifying their subject. Providing just the processes involved with industry and technology limits the scope of study. Knowledge and issues related to the history, control, and values of industry and technology are ommitted, thereby creating a simplistic study of a rich topic. With the simplification of the study of industry and technology, the teachers also risk the alienation of the students. As with workers in industry, when work processes become repetitive technical tasks, alienation of the worker is a frequent result (Bowles and Gintis, 1976). Perhaps, it has been the technical perspective of the curriculum which leads to student disinterest in subjects such as industrial arts. Finally, when teachers are functioning from an unconscious ideological framework, they become suseptible to reproducing unequal class structures. This is an easy trap for industrial arts educators, whose subject matter has been associated with the industry. They become trapped by their choices to teach about the skills needed by the working class and not the knowledge and skills needed by all of society.

How Can Ideology Be Overcome?

As educators struggle with curriculum reconceptualization, the effect of the curriculum planning process and the underlying ideology which supports that process needs to be addressed. Ideology does interact with curriculum planning (Apple, 1979; Kliebard, 1979; Giroux, 1981). Decisions made without confronting the hidden assumptions which guide them can inhibit desired curriculum change. Curriculum change may exist in the written plan, but not in classroom practice.

Bowles and Gintis (1976) have determined that a radical change in the economic structure of the country is necessary for making changes in the schools. This will be a complex process. In order to help teachers to create desired curriculum changes, we must try to understand teachers' ideologies. If curriculum consultants can begin to understand the ideological basis for teachers' decision making and identify the ideological basis for potential changes, then this information can be used to inform teachers as they are making decisions about subject matter. For example, if the teachers' attitudes which supports the teaching of skills and the teachers' attitudes which is required in order to promote students' critical thinking about the industry and technology had been addressed during this project, then the teachers may have been able to make conscious choices about the use and kind of objectives employed.

The attempt to influence teachers' ideology did not occur during this study. It would be interesting to detail such an attempt. It may be that confrontation with the expressed ideology and the way in which it influences curriculum decisions and the reproduction of knowledge may not cause significant change. We need to question the practicality of being able to change ideology upon demand. The forces which support ideologies are deep within present and past experiences. Those forces often have underground sources which lead to enduring ideologies. Technocratic ideology has been one such enduring in industrial arts education.

The actual comprehension, reconceptualization, and practice of teachers may be much harder to change. Little research and analysis today goes beyond identifying the influence of ideologies to how to reconceptualize an ideology. That is an admitted weakness in this paper, but a challenge for future research.

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