1999

Impacts of interdisciplinary team teaching on assessment practices in high school classrooms

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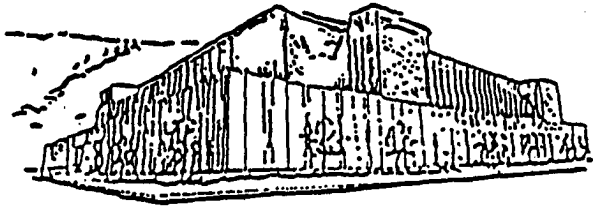
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IMPACTS OF INTERDISCIPLINARY TEAM TEACHING ON

ASSESSMENT PRACTICES IN HIGH SCHOOL CLASSROOMS

by

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presented in partial fulfillment of the requirements
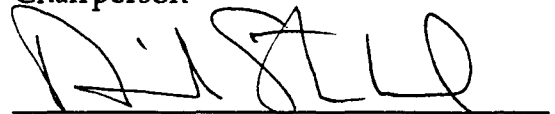
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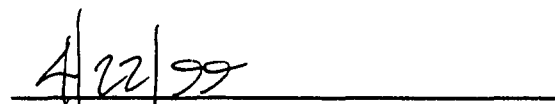Doctor of Education

The University of Montana

1999

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Date

Wortman, Christine, Ed.D., April 1999

Impacts of Interdisciplinary Team Teaching on Assessment Practices in High School Classrooms

Adviser: Dr. Roberta D. Evans

The purpose of this descriptive research was to explore the relationships between interdisciplinary collaborative teaching practices and assessment practices utilized by high school teachers. Underscored by the pedagogical characteristics of teaching practices compatible with Constructivist Learning Theory as advanced by Becker & Anderson (1998), this research involved a sample of fifty-four interdisciplinary teamed teachers employed in Alaska, Idaho, Montana, Oregon, Washington or Wyoming.

A Kruskal-Wallis One-Way ANOVA indicated statistically significant relationships ($p=.05$) between specific learner-centered pedagogical beliefs and learner-centered teaching/assessing practices. Furthermore, there existed a statistically significant relationship between interdisciplinary organizational structures and assessment practices. A continuum stemming from traditional, teacher-centered instruction to facilitative learner-centered instruction closely parallels a continuum stemming from structured, objective assessment measures to open-ended student assessments involving such things as portfolios, essays, debates, and group projects.

The conclusions revealed that--contrary to conventional wisdom--it was the most experienced teachers who demonstrated the highest level commitment to attempting new means of assessing students. They reported significant changes in their teaching styles attributed to interdisciplinary team teaching as well as greater use of portfolios, peer and self-assessments, group projects, and oral presentations than did their more novice colleagues. Additionally, teachers reported that such factors as district policies and school culture played relatively insignificant roles in their decisions to adopt interdisciplinary instructional models; nonetheless, system-wide obstacles in scheduling and preparation time limitations served as powerful barriers to the process.

Recommendations for changes in professional practice include the development of more supportive school district policy wherein careful scheduling and hiring practices facilitate more successful interdisciplinary programs. Professional development in interdisciplinary work through NCTE and other national organizations, as well as pre-service teacher training in interdisciplinary practices, would further help teachers develop curriculum and create standards applicable to interdisciplinary work. National organizations must also help generate conversations about learner-centered education through interdisciplinary collaborative classrooms, leading toward a meaningful and beneficial network of practitioners.

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CHAPTER ONE

INTRODUCTION

From 1620 when the Puritans first arrived in the New World, education has been an important part of our American heritage. That need to educate–that desire for knowledge–has often defined our American experience. Necessarily, that experience has changed, and what it means to be an educated person continues to change (Drucker, 1993).

History

John D. Pulliam wrote: "Futurism in education is not confined to any single discipline or subject area. Indeed, the overreaching feature of treating the future in the curriculum is the interdisciplinary focus" (1968, p. 281). While it may seem ironic to begin a study of the future of education by examining the history of education, a certain insight can be gained in that process. Perhaps the most interesting and challenging feature of American education is that it has always been subject to the conversation of change. Under each new surge of change, American children have been destined to experience ideas, innovations and programs which thrust us to the verge of yet another wave of changes in education. Historically, Johann F. Herbart first developed the idea of associationist theory in the late 1800's, which established the concept that we account for every new idea on the basis of ideas already in the mind (Pulliam, 1987). However, John Dewey protested Herbart's too rigid lock-step approach and then strongly influenced the creation of the Progressive Education Association in the 1930's. This

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development really provided a framework for a philosophy accounting for natural growth and for differences of the individual student (Pulliam, 1987). Perhaps Herbart's associationist ideas and Dewey's reconstruction of experience ideas provided the historic bedrock of a future trend which many in education would identify as a paradigm shift from very teacher-centered or traditional approch to a more learner-centered approach in educational thinking and practices (Panaritis, 1995; Carroll, 1994; Fischetti, Dittmer, & Kyle, 1996; Brooks & Brooks, 1993). Furthermore, this shift encompasses more than the field of education. Wilson (1998), a pioneer of sociobiology, has asserted that a balanced perspective cannot be acquired by studying disciplines in pieces. Wilson has argued that in order to understand our world and to make appropriate decisions about our future, we must develop a balanced perspective. He has suggested that we gain this balanced perspective through the pursuit of consilience, ie., a fluency, or a unity of all knowledge across the boundaries of time, culture and fields of knowledge.

In the education field, Fischetti, Dittmer, & Kyle (1996) have credited John Dewey for several points of this "new" paradigm shift. They have suggested in their study that a current national trend toward generating a new paradigm about teaching, learning and assessing has begun to emerge with foundational roots in the Dewey philosophy. In addition, much of the work has been done to identify changes in instructional emphases by establishing guiding principles of a constructivist nature where learners make assumptions based upon what they know about the world. This construction of a new "knowledge" paradigm demands that learners focus on meaningful subjects through a process of integration and collaboration significantly

different from what students encounter in a more traditional classroom. The concept of interdisciplinary knowledge, however, can be traced from the dawn of Western thinking. Many of the concepts in this educational philosophy are rooted in the ideas of Plato, Aristotle, Rabelais, Kant, Hegel, and other historical figures who have been described as "interdisciplinary thinkers" (Klein, 1990). Klein has maintained that the roots of the concept of interdisciplinarity can be found throughout many discourses. The ideas which embody integration of knowledge can be attributed to Plato, who first advocated the philosopher as the one capable of "synthesizing knowledge" (p. 19-20). Although not yet phrased in terms of interdisciplinarity, the work of a number of writers from the sixteenth through nineteenth centuries, including Francis Bacon, Descartes, Kant, Hegel, and Comte "expressed concern about the fragmentation of knowledge, and each, in his own way, articulated a vision of the unity of knowledge" (pp. 20-21).

Ralph Waldo Emerson, in his singular view on the individual, pondered: "To the young mind everything is individual; stands by itself. By and by, it finds how to join two things and see in them one nature; then three, then three thousand. . . discovering roots running underground whereby contrary and remote things cohere and flower out from one stem" (Fogarty, 1991). If the young mind does indeed desire to find connections which flower into greater understanding and appreciation for the beauty of learning as Emerson suggested, educators have a duty to find ways to help students make the connections across disciplines and assess them accordingly.

Statement of the Problem

The issues involved in a discussion of this problem are multi-dimensional. Interdisciplinary instruction at the middle school level has proven successful and acceptable by teachers and administrators (Lounsbury, 1992; Bean, 1993; Drake, 1993), but it has only recently begun to be considered among high school teachers. Organizations such as the Association for Supervision and Curriculum Development, Science-Technology-Society and the American Association for the Advancement of Sciences have all developed interdisciplinary frameworks providing teachers with suggestions for developing an integrated format responsive to criticism of current educational results on standardized tests (Wraga, 1996). In spite of strong endorsements by educational experts nationwide and highly influential professional organizations in education, there is much ambiguity about what activities constitute interdisciplinary practices (Adler & Flihan, 1997). Furthermore, secondary-level teachers in all disciplines continue to grapple with the transferability of traditional, teacher-centered practices to integrated experiences where more learner-centered teaching situations seem to occur. Finally, state education reform efforts have resulted in ambivalent conclusions about what path to follow (Pitton, 1999; Nelson, 1999; French, 1998; Black & Wiliam, 1998).

Scrutiny of traditional classroom practices, however, has been increasingly critical. According to Perelman (1992), classroom teachers remain isolated, students continue to be bored and lethargic, and the public increasingly demands conflicting and seemingly paradoxical approaches to educating our nation's youth. Traditional teaching and assessment practices

imposed upon integrated classroom situations seem to ignore the basic goals of restructuring attempts. The literature is both incomplete about the composition of a successful interdisciplinary high school classroom, and less forthcoming with discussion on appropriate assessment methods which enhance teaching and learning. Adler & Flihan (1997) have observed that research on how classroom interactions in interdisciplinary classes progress to the assessment stage is missing. Vars (1996) has summarized the problem by observing that most efforts to assess effects of integrated curriculum and instruction utilize standardized achievement tests. Indeed, by the end of the 1930's, most large scale testing had embraced multiple-choice tests because they were considered more reliable, more accurate and more valid than less formal methods (Mislevy, 1996). These tests, which are cheap, quick, and easy to give, claim to provide efficient predictions of success. At the same time, however, they offer little relevancy or utility in more learner-centered classrooms (Mislevy, 1996). Resnick & Resnick (1992) concluded that such standardized tests are "fundamentally incompatible with the kinds of changes in educational practice needed to meet current challenges" (p. 37). Additionally, they claimed that education must focus on problem solving and thinking skills in order to enable graduates to function in future work environments. Even while research has reported a wide variety of successful interdisciplinary combination classes (Diem, 1996), and although middle school curricula have increasingly adapted to a variety of innovative assessment methods, the norm in high schools continues to be characterized by the traditional classroom concept with traditional assessment philosophies (Vars, 1969, 1991).

Dissatisfaction with traditional multiple-choice assessment and teacher centered practices have prompted various responses. Some responses which have begun to emerge are instructional practices engaging students in more learner-centered instruction where students take an active role in their own assessment and assume responsibility for their own learning (LeMahieu, Gitomer, & Eresh, 1995). In addition, performance assessments and the use of portfolios have become part of the educational reform movement. The resulting, often dichotomous solutions, seem to foster a deepening rift between proponents of performance assessments and advocates of standardized assessments.

In an attempt to resolve questions about ways to evaluate educational practices in any classroom, over twenty-three organizations active in national, state and local instruction in grades prekindergarten through twelve such as the National Council of Teachers of English, National Council for the Social Studies, National Middle School Association, National Education Association, National Council of Teachers of Mathematics and others have formed The Alliance for Curriculum Reform. In addition, the National Study of School Evaluation (NSSE) has developed a comprehensive guide for research-based school improvement. The NSSE guide assists schools in developing a continuous process of evaluation. The six-part process includes (1) developing the profile, (2) defining beliefs and mission, (3) defining desired results for student learning, (4) analyzing instructional and organizational effectiveness, (5) developing the action plan, and (6) implementing the plan and documenting results (National Study of School Evaluation, 1998).

The problems which encompass single-teacher, traditional classrooms have continued to mount. The traditional classroom is often teacher-centered rather than learner-centered, accompanied by traditional lectures and testing, one-way communication, extrinsic motivation, and passive participation (Fischetti, 1996). If interdisciplinary classes use traditional assessment methods, the issues which have plagued teacher-centered classrooms may still remain in classrooms which are unsuccessfully attempting reform. The answers to the questions about whether assessment philosophies and practices change in interdisciplinary classrooms may resolve many questions about the effectiveness of high school interdisciplinary organizations.

Purpose of the Study

The purpose of this study was to determine to what extent interdisciplinary, collaborative teaching influences the philosophy and practice of assessment in the high school classroom. The overarching question asked: "Is there a significant relationship between one's assessment practices and teaching practices?" The results of this study could have significant impact upon the curricular planning among high school educators, especially those wishing to restructure schools utilizing interdisciplinary approaches. If interdisciplinary collaborative teaching influences teachers to use more learner-centered assessments, or if teachers are able to identify how learner-centered assessments can be used along with more traditional assessments in order to draw more valid conclusions about student learning, educators will be able to design educational experiences in

accordance with the guidelines established by the National Study of School Evaluation with more consistent results.

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Significance of the Study

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Some researchers believe that the heart of curriculum lies in the assessment of student performance (Anderson, et al., 1996; Pogrow, 1996). The review of related literature in Chapter Two demonstrates that assessment philosophies and attitudes have been changing. Given that changes in curriculum and assessment appear to be occurring rapidly, educators are struggling to respond to the media, politicians, and local communities while providing meaningful evaluations for students within the confines of the schoolhouse. This study was necessary in order to identify where assessment seems to be most successful and relevant in the context of teaching models and scheduling structures. The value of this research lies in its potential to provide a common ground from which teaching approaches can be applied in relationship to assessment practices.

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Definitions of Terms

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For the purposes of this study, the following definitions have been used:

Alternative and/or block scheduling. Arrangements of time which provide teachers and students flexibility in instructional time; also referred to as the alternative-day schedule, the 4/4 semester plan, accelerated schedule, and the trimester plan (Canady & Rettig, 1995).

Assessment. A method which relies on teacher observation and professional judgment used as the basis for evaluating student achievement

(Stiggins, 1997); a method of obtaining data about students in conjunction with experience or instruction on concepts and materials presented in the classroom, identified as curricular-embedded assessment (Mislevy, 1995).

Collaboration. Combination(s) of people with different views and perspectives who share a goal to build new understandings, ideas, approaches or innovations (Hargrove, 1998).

Constructivism. An education theory influenced by Piaget (1972) suggesting that learners internalize new information prompting the emergence of cognitive structures that enable learners to rethink prior ideas or create new ideas (Brooks & Brooks, 1993).

Cooperative learning. A team approach to learning and problem solving found in certain teaching models which foster social skills (Curriculum Report, 1993; Joyce & Weil, 1986).

Integrated/integrative. Used to define a level, depth, or degree to which disciplines undergo curricular content assimilation in interdisciplinary situations (Mathison & Freeman, 1998); also used as an omnibus term to mean interdisciplinary (Adler & Flihan, 1997).

Interdisciplinary education. A level of integration involving two or more disciplines (Drake, 1993) representative of stages of disciplinary blending where knowledge moves along a continuum from being correlated (stage one) to being shared (stage two) to being reconstructed (stage three) (Adler & Flihan, 1997).

Learner/student-centered classroom. Based on the Nondirective Teaching Model developed by Carl Rogers, which focuses on facilitating learning for students to attain greater personal understanding of knowledge

(Joyce & Weil, 1986), and subscribes to theoretical tendencies of Constructivism (Brooks & Brooks, 1993); reflected in many strategies employed by teachers such as peer group modeling, editing, assessing, cooperative learning, problem solving, performance learning and active participation (Fischetti, Dittmer, & Kyle, 1996). Caine & Caine (1991) have made reference to learner-center teaching as brain-based teaching in some comparison models.

Performance assessment. A variety of ways to provide accurate information about what students know and are able to do (Mitchell, 1992). Includes such things as peer assessment of student, group, and individual research, oral presentations, and cooperative learning strategies (Turner & Finney, 1993).

Portfolio assessment. A collection of student work, selected and assembled by that student to represent his/her achievements, which must include guidelines for the selection, criteria for judging and student self-reflection (Stiggins, 1996; Yancey, 1992).

Psychometrics. The science of mental measurement, or the assigning quantities to mental products (Mitchell, 1992).

Selected response assessment. Includes all of the objective options such as multiple-choice, true/false, matching, and short answer. Standardized tests and traditional teaching methods rely on selected response as a primary assessment tool (Stiggins, 1997).

Standards-based reform. A national and traditional education model which spells out what children should know and be able to do at each grade level (Clinchy, 1998), and/or a more progressive school evaluation

framework able to expand the capacity of schools to enhance organizational learning by promoting critical reflection and dialogue (Fitzpatrick,1998).

Team teaching. Defined to have two primary functions: (1) to plan and develop integrated curriculum together, and (2) to implement the curriculum together (Maurer, 1994); includes unified presentations, collaboration, cooperative planning and teaching (Erb, 1992).

Traditional classroom. A classroom characterized by traditional lectures, testing, one-way communication, extrinsic motivation, and passive participation, and by focus on single subject matter, teacher-centered instruction employing lecture and whole-group settings, materials emphasizing textbooks, assessment by written tests and emphasis on grades (Posner, 1995); most often found in the information-processing family of teaching models (Joyce & Weil, 1986).

Transdisciplinary. A global approach to classroom instruction which incorporates multiple components not always found in other approaches and identified as the sixth model along Drake's continuum (1993); would be considered the final or reconstructed knowledge stage of Adler & Flihan's continuum (1997).

Delimitations

This study explored the relationship between teachers' interdisciplinary classroom experiences and their assessment philosophies and practices. Furthermore, this study had several delimitations. First, The National Council of Teachers of English (NCTE) provided much of the literature and work in interdisciplinary curriculum as well as much of the work on

portfolios. As a result, interdisciplinary teams identified through NCTE have been studied. Second, the study focused only upon interdisciplinary assessment practices of teachers in regular education classrooms. No special education classes were a part of this investigation. Third, this study gathered information only from high school teachers who have team taught. Fourth, this study was delimited to teachers in the Northwestern part of the United States (Region Seven as desiganted by the National Council of Teachers of English) including Montana, Oregon, Idaho, Alaska, Wyoming, and Washington.

CHAPTER TWO

REVIEW OF THE LITERATURE

The purpose of this study was to determine to what extent interdisciplinary collaborative teaching practices influence the philosophy and practice of assessment in high school classrooms. A review of the literature guided this research by examining several relevant issues about the ways in which integrated classroom practices and philosophies link to traditional teaching models, curriculum designs, and assessment practices.

Analysis of Curricular Designs

This review of literature examined common curricular designs as they applied to integrated situations in particular teaching models. For the purposes of this study, combinations of curriculum designs, integration choices and teaching models were analyzed in an effort to understand how these models might appear on a continuum of most traditional or teacher-centered to most learner centered. Posner (1995) identified five theoretical perspectives on curriculum which he has indicated to be pedagogical tools helpful in analyzing curriculum. According to Posner, the traditional perspective was advanced by W. T. Harris, who focused on transmitting the cultural heritage of Western civilization. The experiential perspective, a principal basis for John Dewey's work, seeks experiences which will help children grow. The structure of the disciplines, based on the work of J. S. Bruner, depicts subject matter as dynamic, with each discipline having its own way of conducting inquiry, and dictates that education should be

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developed around several "modes of inquiry." Behavioral perspectives, founded by behavioral psychologist E. Thorndike, attempted to address what the child should be able to do at the completion of the curriculum. Posner identified the cognitive perspective through the work of Jean Piaget who asked about the development of intelligence in children. Of the five perspectives (traditional, experiential, structure of the disciplines, behavioral, and cognitive), elements of each can be found in most curriculum designs, especially in integrated curriculum. Posner identified the traditional, subject matter focus as the typical departmental organization of contemporary secondary schools. The Bruner perspective (structure of the disciplines) suggested that each discipline had certain fundamental ideas guiding inquiry and certain ways of answering questions. The Thorndike perspective (behavioral) defined the content of the curriculum based on specific observable and measurable behavioral or performance objectives and requires a change in behavior. The Piaget perspective (cognitive) shifted from rote learning to learning which required understanding and sense making.

Finally, Posner identified the experiential curriculum to include such characteristics as (1) crossing subject-matter lines; (2) relying less on textbooks; (3) being more student-centered, emphasizing small-group, cooperative student structures; (4) organizing around longer periods of time; (5) depending on the teacher as a facilitator; and (6) employing evaluation methods directed at demonstrating competence. Of the five perspectives, the behavioral and traditional perspectives tend to be most representative of the typical classroom, while experiential curricula tend to be most representative of the interdisciplinary classroom.

Piaget (1972) distinguished a discipline as a specific body of teachable knowledge which has its own background of education, training, procedures, methods, and content. Jacobs (1989) has suggested that there is a relationship among fields of knowledge. This relationship applies methodology and language from more than one discipline to examine central themes, issues or problems which she termed interdisciplinary. Transdisciplinary, on the other hand, moves beyond the scope of the disciplines, becomes more global, and naturally incorporates multiple components of curricular design. Transdisciplinary emphasizes meaning and relevance through a life-centered approach. Biologist Edward O. Wilson (1998) has advocated the principle of universal consilience across all the natural sciences and the humanities. He has suggested that the fragmentation of knowledge is an artifact of scholarship resulting in the chaos of fragmented learning. He has further suggested that a balanced perspective can only be acquired by studying the relationships among disciplines. He has argued that true reform in education must come from a "consilience of science with the social sciences and the humanities in scholarship and teaching" (p. 13). He has further asserted that the search for consilience in education will "renew the crumbling structure of the liberal arts" (p. 12).

Correspondingly, many experts argue that how the learner responds to the educational situation is much more important than curriculum content. Piaget, for example, asserted that the fundamental characteristics of learning and cognitive development are organization and adaptation. He saw true learning as an assimilation and accommodation of information (Pulliam & Van Patten, 1995). Skinner, the best known scholar in the field of

behaviorism, described human behavior as a stimulus-response relationship which suggests a direct relationship between stimulus and what students learn or experience (Pulliam & Van Patten). Despite developmental and behaviorist studies which have strongly linked the more abstract, reflective approach of a learner-centered classroom, more traditional views of education which stress concrete and measurable accomplishments have continued to dominate many educational philosophies evident in schools today (Brooks & Brooks, 1993). Berliner & Biddle (1995) have suggested that a basic difference between the learner-centered philosophy and the traditional philosophy is the difference between intrinsic motivators and extrinsic motivators. Proponents of the paradigm shift to a more learner-centered classroom have extolled the virtues of intrinsic motivation as a way to promote good education while condemning the traditional approach as too teacher-centered. This in turn creates accountability to an outside or extrinsic motivator (Fischetti, et al., 1996). Senge (1990) has referred to personal mastery as the "essential cornerstone of the learning organization" and further suggested that personal mastery means "continually clarifying and deepening our personal vision" (p. 7).

Finally, although there may appear to be a polarization of ideas between the learner-centered and the traditional models, some have suggested that modification of both ideas create classrooms where both tradition and learner-centered techniques can co-exist. For example, Wiggins & McTighe (1998) have argued that a multifaceted view of what makes up learning provides the most reasonable model. They have explored six facets of understanding which include explanation, interpretation, application,

perspective, empathy, and self-knowledge.

In addition to the perspectives of curriculum designs which have suggested that many characteristics of each design can be found in all kinds of teaching situations, other issues such as learner responses and organizational structure, can also influence curricular designs.

Integrated Designs

Curricular models become increasingly complex when integration of disciplines is adapted as part of the model. This discussion of integrated designs will serve to review a variety of approaches educators currently use. While there are many variations of curricular design, Martin-Kniep, Feige, & Soodak (1995) identified three integrated forms: (1) interdisciplinary curriculum, which is either within a classroom or across different classes; (2) integration around skills, a form often referred to as threaded curriculum; and (3) integration of a student's experiences, internal life and school curricula. Mathison & Freeman (1998), in a review of 150 educational publications and essays, identified three curricular design models as interdisciplinary, integrated, and integrative. These models correspond closely with earlier versions.

Fogarty (1991) found ways to integrate curriculum, including (1) the fragmented model, (2) the connected model, (3) the nested model, (4) the sequenced model, (5) the shared model, (6) the webbed model, (7) the integrated model, (8) the immersed model, and (9) the networked model. Gordon Vars (1969) suggested block-time, subject-area block, and unified studies as steps toward a core class. Martin-Kniep, et al. (1995) made

distinctions between parallel teaching of theme-based curriculum and other forms of interdisciplinary curriculum. Diem (1996) outlined a project which attempted to form integrated/interdisciplinary instruction; however in reality, the model appears to be parallel teaching of integrated units.

In spite of the perplexing array of integrated definitions, certain key principles have persistently appeared in the literature. Jacobs (1989) has outlined a continuum of options for content design as depicted in Figure 2.1. Jacobs continuum indicates that curricular designs move from separate subjects in traditional classrooms to more learner-centered designs.

Figure 2.1

Jacobs (1989) Interdisciplinary Continuum

Highly Learner-Centered

6) Student created designs

5) Integrated-day (themes)

4) Interdisciplinary designs

3) Multidisciplianary designs

2) Parallel designs

1) Separate subjects
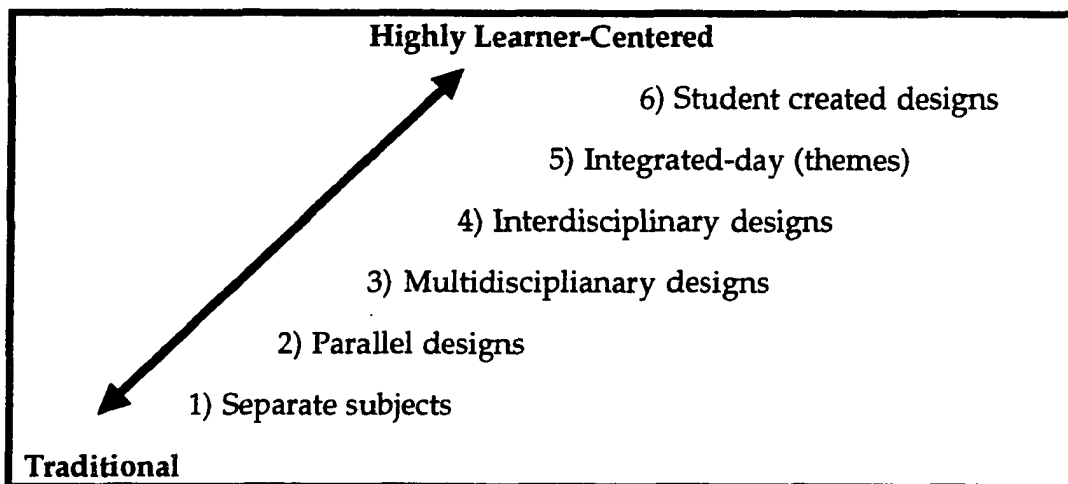
Traditional

As the continuum moves from traditonal to learner-centered, the boundaries between subjects become more blurred until they are eliminated: (1) the discipline-based design focuses on a strict interpretation of the disciplines with separate subjects; (2) parallel discipline designs happen when teachers sequence their lessons to correspond to lessons in the same area in other

disciplines; (3) multidisciplinary or complementary designs suggest that certain related disciplines be brought together to investigate a theme; (4) interdisciplinary units bring together the full range of disciplines in the school's curriculum for a specific duration; (5) the integrated-day model is a full-day organic approach based primarily on themes and problems; and (6) the complete program is the most extreme form of interdisciplinary work in which students create the curriculum out of their day-to-day lives. While each of the designs appear to be clearly defined, there is no current research indicating at what point teachers cross-over from traditional to learner-centered practices in curricular designs, teaching strategies or assessment practices.

Drake (1993) offered a similar continuum: (1) the multidisciplinary curriculum includes content from other disciplines to increase relevance; (2) the interdisciplinary-skills curriculum integrates the subject areas and shifts the emphasis to learning how to learn; (3) the transdisciplinary/real-world approach sets the themes into real-life context. This third approach shifts to questions about how to make students productive citizens and emphasizes relevance through a real life or cultural context.

Adler & Flihan's (1997) have examined current relevant literature and refer to the interdisciplinary continuum as being composed of three ways of knowing, representative of disciplinary blending. As demonstrated in Figure 2.2, stage one is correlated and is represented as parallel or sequential. Stage two is shared knowledge represented as integrated and actively thematic. Stage three is reconstructed knowledge and represented as synthesized or blended.

Figure 2.2

Adler and Flihan (1997) Interdisciplinary Continuum

Correlated Knowledge ➞	Shared Knowledge ➞	Reconstructed
Represented as:	**Represented as:**	**Represented as:**
Multidisciplinary	Thematic (active)	Synthesized
Complementary	Interdisciplinary	Blended, fused
Juxtaposed	Integrated	Core curriculum
Parallel, sequenced	Broad-field curriculum	Problem-centered
Thematic (passive)		Integrated/ive
Webbed		
Characterized by:	**Characterized by:**	**Characterized by:**
Related concepts	Preserving disciplinary boundaries	Eliminating boundaries
	Overlapping concepts	
	Emergent patterns	
	Disciplines mutually supported	
Disciplines most distinct	➞	**Most blended**

Note. From The Interdisciplinary Continuum: Reconciling Theory, Research and Practice (p. 5), by M. Adler and S. Flihan, 1997, Report Series 2.36, Albany, NY: National Research Center on English Learning & Achievement. Adapted with permission.

The Adler & Flihan report has provided a comprehensive and inclusive continuum which articulates the current theoretical understanding of interdisciplinary education and will serve as a continuing guide for discussion of curricular models. According to Adler & Flihan, correlated knowledge is the first stage beyond traditional disciplines in interdisciplinary education. It retains traditional practices, but attempts to demonstrate broad-based connections between subjects. Thematic teaching is passive because the concepts are connected through the material, but the individual disciplines still remain the focus of instruction. Shared knowledge, which is stage two, focuses upon knowledge actually shared between disciplines. This shared knowledge can be characterized by interdisciplinary units where concepts from each discipline support the concepts of other disciplines. Fogarty (1991) characterized this as integrated or cross-disciplinary. Finally, the reconstructed knowledge stage refers to a vision of knowing without regard to disciplinary boundaries. Adler & Flihan (1997), Jacobs (1989), Fogarty (1991), and Bean (1991) have all refered to this stage as student-centered and integrative. This model has organized the theoretical models to correspond to interdisciplinary education in practice.

Teaching Models

As the curricular design becomes incorporated into interdisciplinary curricular design, the teaching models noted below added the final dimension to be considered in this study. Joyce & Weil (1986) have grouped teaching models into four families, including (1) the information-processing family, which identifies models affecting information processing, including

models such as concept attainment, inductive thinking, and memorization; (2) the personal family, which includes models such as non-directive teaching, synectics (a teaching strategy to help students learn problem-solving skills in cooperative groups), and classroom meeting; (3) the social family, which includes cooperative learning models like group investigation, role playing, and social science inquiry; and (4) the behavioral systems family, which includes models like mastery learning and direct instruction, assertive training, and learning self-control.

While elements of many teaching models may be found in any teaching situation, some models adhere more closely to integrated classrooms than others. For example, more traditional classrooms would theoretically adhere more closely to the information-processing family, while the cooperative learning models seem to align more readily with the experiential curricula and are consistent with interdisciplinary classroom constructs. Although the social family, identified by Joyce & Weil (1986) as cooperative/collaborative learning or group investigation, has been a limited part of some traditional classroom experiences, it has also become an indelible part of the interdisciplinary/integrated classroom (Drake, 1993; Lounsbury, 1992; Caine & Caine, 1991).

Successful cooperative group learning indicates that students learn and practice civic responsibility through a cooperative learning model (Goodsell, 1992). Students soon discover that with the use of appropriate communication skills and group thinking techniques, learning becomes more interesting and rewarding. Students reported greater ease in speaking when they presented as a group. They demonstrated better understanding of

the issues and more responsibility toward learning when they worked together. Proponents of cooperative learning have suggested higher student achievement, better classroom attitude, increased retention and better social skills to be the benefits (Canady & Rettig, 1996). Research also has suggested that when teachers include varied ability levels, gender and different ethnic members in a group, they increase the validity of the interdisciplinary model (Lounsbury, 1992). The teaching style in the cooperative learning classroom transcends the traditional style by creating opportunities on a regular basis for students to become active participants in their learning.

While students most often participate in cooperative learning group efforts, teachers must also cooperate and collaborate for this practice to be effective. Hargrove (1998) has made a distinction between collaboration and cooperative teamwork: "While all collaborations involve teamwork, not all teams are collaborative. Collaborations involve the creation of new value by doing something radically new or different. . . . Most teams are focused on routine work. . ." (p. 6). Posner (1995) has suggested that collaborative approaches would include (1) teachers working in collegial settings, (2) teachers observing each other's teaching and discussing each other's ideas, (3) teachers establishing benchmarks of child development, (4) teachers establishing evaluation goals seeking to understand curriculum from the students' and teachers' perspective rather than from standardized or formal testing, and (5) teachers' implementation becoming a process of multiple interpretations. Thus, collaboration becomes an act of shared creation. For teaching teams, this act of shared creation equals collaborative team teaching and can often be used as a model for students.

As teachers begin to use various combinations of curricular design in their teaching models in an attempt to create interdisciplinary situations, they must also consider organizational or scheduling structure.

Scheduling/Organizational Structure

Curricular design has been inherently tied to scheduling structure, particularly in integrated high school models. Unlike middle schools, traditional high schools have been bound to schedules which can produce a legitimate allocation of credit by Carnegie Units. Canady & Rettig (1995) have leveled various criticisms toward the single-period model of high school scheduling which include (1) the impersonal nature of high schools, (2) exacerbation of discipline problems, (3) a limit of instructional possibilities for teachers, (4) lack of flexible time, and (5) increased in stress for teachers and students. They have concluded that although the Carnegie Unit has come under attack in recent years while states and schools have begun to struggle with the possibilities of "achievement-based" graduation standards, the structures available to students who need more or less time to learn remain largely unchanged.

Of all the components in an interdisciplinary model, block scheduling imposes more total school and community commitment than other alternative scheduling plans. Many interdisciplinary programs nontheless exist within single-period daily schedules or alternative day schedules. The literature has suggested block scheduling as a key component of successful integrated high school programs (e.g., Edwards, 1995; Cardellichio, 1995; Wilson, 1995; Shortt & Thayer, 1995; Buckman, King & Ryan, 1995). Vars

(1991) has identified block-time as an important option educators have for helping students make sense out of their learning experiences. Development of meaningful units and lesson plans which address subjects in different ways by different teachers suggests implementation of block programing (Martin-Kniep, et al., 1995).

Organizational structure is a continuing challenge for high school administrators who are dedicated to providing the optimal learning experience for students. Block scheduling and team teaching, however, may provide inspiration for the learning community of the future (Giella & Stanfill, 1996). Canady & Rettig (1995) have concluded that scheduling should be viewed as a resource, solve problems related to the delivery of instruction, and facilitate desirable programs and instructional practices.

Team organization is essential to the development of integrated curriculum, especially at the secondary school level, because of the specialization of subject matter and expertise (Maurer, 1994). Although team organization may be essential, Panaritis (1995) has identified time to learn, plan, implement and evaluate as a team some of the most important ingredients of a successful integrated program. While these steps all contribute to team teaching, the process of actually teaching as a team is complicated and requires the careful planning of all teachers on the team (Lounsbury, 1992).

Just as curricular/teaching models can be placed on a continuum to examine most traditional or teacher-centered to most learner-centered, so scheduling and organizational structures can be placed on a continuum to examine an increasingly integrated/interdisciplinary format. One additional

component must be studied in a similar manner. The final component to be considered in this literature review is assessment practices.

Assessment Practices

While there is an apparent dearth of research regarding changing assessment practices of teachers who teach in integrated situations, certain attitudes have been identified which may influence changes. First, curricular objectives define and drive assessment practices in high school classrooms, just as assessment outcomes define and drive curricular choices (Stiggins, 1994). Second, collaboration and integrated instruction continue to remain a viable option in education facilitating the academic, psychological and social needs of high school students (Hlebowitsh & Wraga, 1996; Lounsbury, 1992). Third, innovation must come from personnel who will implement the change (Stiggins, 1994).

Wiggins & McTighe (1998) have suggested that teachers should begin to design curriculum and learning with questions about what evidence is appropriate to demonstrate student understanding and proficiency. They have referred to this as a "backward design" approach.

Educational Trends in Assessment Reform

Debates about how to assess students and evaluate schools have received national attention. Stiggins has asserted that the trend has moved away from an era of assessment for sorting towards an era of assessment for competence. Stiggins has further outlined the sixty-year development of psychometric research which defines assessment as the quantification of

student achievement (p. 24). This quantification has been the basis of much of the work done toward centralized assessment and standardized testing programs. According to Stiggins, however, these large-scale standardized tests have done little to improve schools because there has been (1) no link to instruction, (2) low-resolution portrait of student achievement caused by the need to test large numbers of students with objective tests, and (3) invalid assumptions about origins of improvement (p. 27).

Others have outlined the functions of testing as (1) public accountability and program evaluation, (2) instructional management and monitoring, and (3) student selection and certification (Resnick & Resnick, 1992, p. 48). Assessment reform efforts on the national, state and local levels in recent years have resulted in projects such as the New Standards Project in 1991, which have established partnerships with states and organizations to formulate new recommendations for assessment (Khattri & Sweet, 1996).

Another national effort established in 1984 at Brown University was the Coalition of Essential Schools with the purpose of promoting school reform. As of March 1996, more than 790 schools had been affiliated with the Coalition of Essential Schools, which has been planning or exploring the implementation of new practices based on the nine common principles of Essential Schools (Sizer, 1996). The Coalition has established a set of common principles intended to provoke thought and help frame a basis for reform. The sixth principle pertains to assessment, which essentially specifies the awarding of diplomas to students upon a successful final demonstration of mastery for graduation. Multiple forms of evidence ranging from observation to completion of projects and performances should be used to assess the

students (Sizer, 1996).

As a result of the Goals 2000: *Educate America Act* (P. L. 103-227), enacted in 1994, forty-eight states have applied for federal grants which encourage states to develop standards-based education systems. States identified as trail blazers because of their work in the development and implementation of innovative performance-based assessments include Kentucky, California, Connecticut, Maryland and Vermont (Khattri & Sweet, 1996).

The Northwest Regional Educational Laboratory has provided a research synthesis reflecting classroom and school practices which have been shown to foster positive student achievement. Their findings include recommendations for schools to engage in increased use of alternative assessments which align with curriculum and instruction and encourage teachers to incorporate alternative assessment practices into their classrooms (Cotton, 1995). These recommendations reflect the work of other efforts.

Currently, The National Study of School Evaluation, governed by representatives of six regional school accreditation associations together with the Alliance for Curriculum Reform has a membership comprised of more than twenty-three national organizations. These members review content area expectations for student learning as defined by each of the national curriculum associations. As a result, school wide goals for student learning have been identified. These goals included (1) learning to learn skills, (2) expanding and integrating knowledge, (3) communication skills, (4) thinking and reasoning skills, (5) interpersonal skills, and (6) personal and social responsibility (National Study of School Evaluation, 1998).

While national level efforts to provide guidelines for evaluation and assessment practices have gained much attention, state, district and school level performance assessment efforts abound. Most states experimenting with performance-based assessments, however, at least consider national guidelines as they develop new assessments. Some examples are Vermont and Kentucky (Kane & Mitchell (1996). One organization which has provided a forum for the professional development of teachers and participated in developing new forms of assessment is the National Council of Teachers of English (NCTE). With a membership of over 90,000, NCTE sponsors 130 regional, state and local affiliates whose members teach English and the language arts throughout the United States. This organization with its large membership has impacted assessment practices of teachers throughout the nation and continued to facilitate conversations nationwide about future appropriate teaching and assessment practices.

Characteristics of Assessment Practices

Assessment practices vary according to purpose and audience. Much work has been done to formalize differentiated purposes of assessment. For example, Mislevy (1996) has identified elements of mental measurement which include (1) targets of inference, (2) assessment data, and (3) test theory. He has asserted that "formal" assessments, most often typified by standardized tests, sharply contrast with "informal" assessments typified by projects, work in class, and conversations with students. Informal assessments tend to guide instruction while formal assessments communicate to larger audiences about programs.

Others have not distinguished between formal and informal assessments but instead have offered guiding principles as a foundation for sound assessment practices. One such example has included (1) clear thinking and effective communication, (2) teachers in charge, (3) students as key users, (4) clear and appropriate targets, (5) high-quality assessment, (6) attention to interpersonal impact, and (7) assessment as instruction (Stiggins, 1997, pp. 10-18). Stiggins has further identified how assessment has been making a transition from assessment for sorting to assessment for competence. He has identified four basic assessment methods which include (1) selected response assessments, (2) essay assessments, (3) performance assessments, and (4) assessments that rely on direct personal communication with the student (p. 81).

Mitchell (1992) has asserted that norm-referenced, multiple-choice tests are not only considered unreliable indicators of achievement, but also corrupters of teaching and learning. According to her, multiple-choice tests undermine teaching and learning as follows:

(1) Selected responses are passive, so students do not contribute to their own thinking.

(2) Tests promote the ideas that right or wrong answers are available to all questions.

(3) Tests rely on memorization only, not understanding.

(4) Test makers must select what can easily be tested, not what is important.

(5) Tests do not accurately record what students know and can do.

(6) These tests trivialize teaching and learning--tests students' ability to take tests.

Howard Gardner claims that earlier testing assumptions have been changed by the work of developmental, cognitive and educational studies, and that an increasing importance has been placed on human cognition and the ability of humans to communicate through the "multiplicity of intelligences" (Gardner, 1992). Gardner cited cross-cultural research as an example of how people can fail a "formal" test, while simultaneously demonstrating expert skills in the course of ordinary or authentic application. Thus, the stage has been set for alternative assessment formats which are appropriate within the classroom, but which may also serve as useful program evaluations (Jones & Chittenden, 1995).

Kane & Mitchell (1996) have identified performance assessment to include alternative assessment and authentic assessment, but have insisted that true performance assessment implies active student production of evidence of learning. Multiple-choice tests, based on a behaviorist model of education, have lost favor with many educators because of the demands for more sophisticated thinking skills (Resnick & Resnick (1992). Constructivest models of cognition, according to Kane & Mitchell (1996), have begun to change educators' thinking about teaching and assessment. They have suggested that educators should personalize and individualize student learning and thus student assessments:

> Thus, the following corollary related to this view of learning
> simultaneously gained currency in the reform movement: Because an
> individual constructs knowledge in his or her own way, a customized

rather than a mass approach to education is necessary to enable him or her to achieve high standards (p. 4).

Traditional classroom assessment has already included methods such as classroom participation, notebooks, reports, homework, and classroom discussion (Ornstein, 1994). English classroom assessment techniques more commonly have become the writing assessment and the reflective portfolio (Herman and Winters 1994; Yancey, 1992; Benoit & Yang, 1996; Tchudi, 1994). Self-assessment, reflective assessment, self-imposed goals, and evaluation of the success of those goals are all common characteristics of student portfolios. The literature offers ample evidence that the student knowledge base demonstrated in the presentation of the portfolio is equal to student performance in an objective evaluation (Herman & Winters, 1994). There is some evidence, however, that the portfolio is superior to the objective test when measuring student ability to write or to understand abstract concepts (Herman & Winters, 1994). Speeches, role plays, demonstrations, and writings are all performance based and can be reflectively assessed and become part of the portfolio (Bartz, et al., 1994).

Posner (1995) has identified paper-and-pencil tasks, performances, and folios as three major format categories in integrated evaluation. He has argued that the paper-and-pencil tasks are most like traditional evaluation. He has also argued that the boundaries between formats are unclear and span categories which are not mutually exclusive. In any case, much work must continue which will provide collaborating teachers in interdisciplinary classrooms some direction and standards for successful use of this method of assessment (Benoit & Yang, 1996).

Stages of Development

No assumption can be made about where teachers are on a teaching model continuum when they begin their interdisciplinary teaching experience (Posner, 1995). Additionally, no assumptions can be made about what assessment practices teachers will decide to use or when they will change from one assessment model to another. One question which becomes apparent, however, is whether teachers who adopt more learner-centered teaching models will adapt more learner-centered assessment practices.

Stages of Adaptation

Stages of adaptation have been framed in many ways. Teachers adapt to changes depending upon the teacher, the teacher's training and the environment. Adaptation to innovations is a process which teachers undergo, but what causes a teacher to change a teaching practice remains a mystery. Hall, George, & Rutherford (1979) have clearly established that there are phases or stages teachers undergo as they experience changes in what they do or what they are expected to do. The mental activity of questioning, analyzing, considering, anticipating and accepting consequences (called concerns) are important to any process and must be understood and responded to appropriately. People enter different stages of concern depending upon the amount of information they have and the level of personal investment teachers perceive. Fidelity, mutual adaptation, and enactment are three perspectives on curriculum implementation (Van Zandt & Albright, 1996). These can be envisioned as points on one type of continuum.

On one end of the continuum, the fidelity perspective implies that curriculum is created outside the classroom by someone besides the teachers. Extensive training accompanies attempts to ensure implementation. The mutual adaptation perspective implies that the curriculum is developed by outside experts, but adapted by teachers to the context of their classrooms. Training is needed to familiarize teachers with the curriculum, but the teacher shapes the curriculum to meet the specific needs of the students. Finally, on the other end of the continuum, there is the enactment perspective. Here, the curriculum, viewed as a process rather than a product, becomes an outgrowth of the teaching and learning. Change in beliefs and ideas result in new curriculum, rather than new curriculum changing teacher beliefs and ideas (Synder, Bolin, & Zumwalt, 1992).

Loucks, Newlove, & Hall (1975) have identified several levels of use of an innovation, but the most relevant to this study include Level 0 as a non-use state in which the user has little or no knowledge of the innovation, and Level V as the integration state in which the user combines innovation with related activities of colleagues to achieve a collective impact on students. Whatever the level of innovation, change is a fluid process rather than a static end. What has not been explored is to what extent interdisciplinary teaching practices have altered assessment practices on a level of innovation where change is a fluid process.

The Becker & Anderson Link

As teachers enter into interdisciplinary teaching situations, they begin to consider alternative options for content design and perhaps alternative

options for assessment. The Becker & Anderson (1997) survey has provided the questions and the validity study which will guide this research to better understand the relationship between teaching practices and assessment practices. Becker & Anderson have identified 37 characteristics of teaching practices and beliefs which centered on a need to make learning personally meaningful for students, a desire to engage students in cognitively demanding tasks, and a focus on support for social patterning of learning (Appendix A). These characteristics are consistent with the Northwest Regional Educational Laboratory School Improvement Research Series. For example, one suggested classroom practice has been that teachers make use of alternative assessment such as peer assessment and performance assessments (Cotton, 1995, p. 21). Questions adapted from the Becker & Anderson research and used in this study directly addressed this issue.

The survey questions are also consistent with the characteristics described by Adler & Flihan (1998), who have provided multiple examples of how teachers utilize student-centered, collaborative classrooms and assessment practices including research papers, exhibitions, and projects. Adler & Flihan have reported that what is "missing from almost all of the research is an in-depth study of how the classroom interactions progressed to the assessment stage" (p. 14). The survey questions borrowed from Becker & Anderson have directly asked teachers to describe assessment practices and to what extent those practices have changed. Finally, the Becker & Anderson survey is consistent with the National Study of School Evaluation Standards and the Alliance for Curriculum Reform. For example, the Alliance has suggested that assessments should enhance teaching and learning and

"include a variety of methods such as realistic performance assessment, portfolios and projects" (p. 1). This study may provide some insight regarding teachers in various stages of change who are using a variety of assessment methods ranging from very teacher-centered to very learner-centered. Their changes including evaluation methods--both traditional and new may offer more information about the relationship between teaching practices and assessment practices.

The literature review disclosed a considerable absence in the research of interdisciplinary teaching and assessment practices in high school classrooms. While there is much speculation about the impact of integrated curriculum, team teaching, cooperative learning, and learner-centered assessments, no research providing insight into an interdisciplinary class using all of these components was apparent. Current research, therefore, which focuses on high school interdisciplinary classrooms described in this research will provide valuable information about innovative teaching.

CHAPTER THREE

METHODOLOGY

The purpose of this research was to explore the relationship between interdisciplinary collaborative teaching practices and assessment practices of teachers. Kerlinger (1975) has outlined how the systematic attempt to explain relations between phenomena is a legitimate quantitative approach to research. The central question of this study was whether teachers' experiences with interdisciplinary, collaborative teaching alter classroom assessment practices.

Research Design Overview

This research was descriptive in nature. It utilized a survey to study groups of teachers with similar interdisciplinary collaborative teaching experiences to determine to what extent, if any, their assessment practices changed. Creswell (1994) identified economy of design, rapid turn-around in data collection and ability to identify attributes of a given population as advantages of survey designs. Borg & Gall (1983) have suggested the cross-sectional survey design to be appropriate in the investigation of a particular educational question.

The causal-comparative design involves selecting two or more groups that differ on a particular variable (Fraenkel & Wallen, 1990). Borg & Gall (1983) have pointed out that *ex post facto* research allows investigators to study causes after they have "presumably exerted their effect on another variable" (p. 533). The causal-comparative design is similar to the

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correlational studies because both explore relationships among variables. The causal-comparative studies differ from the correlational studies in that the former involve at least one categorical variable, or group membership. In this causal-comparative method, the independent variables were interdisciplinary collaborative practices which included the interdisciplinary curriculum and teaching model, as well as the structure and organization of team teaching. Teaching teams which self-identified very traditional teaching styles and/or curricular implementation models in their teaching practices were grouped together as the independent variable. Teaching teams which self-identified learner-centered teaching styles and/or curricular implementation models in their teaching practices were grouped together.

Because a major threat to the internal validity of a causal-comparative study is the possibility of a subject characteristics threat, Fraenkel & Wallen (1990) suggested that one way to control for extraneous variables is to match subjects from the comparison groups on the independent variable. In this case, for example, learner-centered teams were matched with other learner-centered teams as closely as possible, and traditional teams were matched with other traditional teams as closely as possible. The dependent variables were classroom assessment practices. Although various purposes and methods of assessment exist (Posner, 1995), this study considered only assessment practices used by teacher teams which evaluated student learning within the classroom experience.

Research Questions

This research was investigated through the following hypotheses:

H_1: There will be a statistically significant relationship between pedagogical beliefs reported by interdisciplinary teachers and the teaching styles and/or assessment practices they use.

H_0: There will be no statistically significant relationship between pedagogical beliefs, and

      a. assessment practices of interdisciplinary team teachers, or

      b. teaching styles of interdisciplinary team teachers.

H_2: There will be a statistically significant relationship between interdisciplinary experiences and assessment practices.

H_0: There will be no statistically significant relationship between interdisciplinary experiences and assessment practices.

Borg and Gall (1983) indicated that once the researcher has identified possible causes of the phenomena, the differences in a number of variables can be investigated in order to determine which variable or combination of variables seems to cause the phenomena (p. 308). The Becker study has identified many of these possible causes which were studied in the survey (Appendices A and B).

Sample

The sample of teachers selected for this study consisted of fifty-four secondary school teachers who have been team teaching in an interdisciplinary regular education classroom for at least a year. Initial selection of teaching teams required nomination through the National

Council of Teachers of English (NCTE) in Region Seven. Presidents, vice presidents or their designated contact persons from each state were asked to identify teachers of diverse subjects at secondary levels who have been teaching in interdisciplinary, collaborative situations. These contact persons of state chapters in Montana, Oregon, Idaho, Alaska, Wyoming, and Washington were asked to provide available information needed to obtain an appropriate number of potential respondents.

NCTE was the appropriate gatekeeper/clearinghouse organization from which to draw this sample because it is a major professional and scholarly organization involved in all aspects of education including partnerships with the New Standards Project since 1991 (Kane & Mitchell (1996) and The Alliance for Curriculum Reform. In addition, English teachers (NCTE) have been particularly active in current work on performance assessments such as portfolios and other written assessments such as The National Writing Project and Advanced Placement (Tchudi, 1994). Furthermore, because proficiency in language is a common need across other disciplines, English teachers are often involved in collaborative team teaching activities.

<div align="center">

Instrumentation

</div>

The survey instrument included modifications to and selective use of an existing instrument. Permission was requested (Appendix C) and granted (Appendix D) to use an instrument modified from a study funded by the National Science Foundation and the U. S. Department of Education, Office of Educational Research and Improvement (Becker & Anderson, 1998). The

questions used in the Becker study directly address the 37 pedagogical characteristics of teaching practice and pedagogy compatible with constructivist learning theory. Questions A1 and A2 of this dissertation studied self-reported teaching philosophy to categorize teaching philosophy as traditional or learner-centered. Becker's validation study of the instrument he used for his study (modified for this research) is a comparison of teacher self-report and field researcher coded judgments. The field researchers for the Becker study used coding sheets to record five validation activities: (1) classroom observation, (2) interview one, (3) interview two, (4) artifacts such as tests, quizzes, and student assignments, and (5) summative coding by the specially trained field team. The coding was based on a three-point scoring rubric in which three (3) represented teaching consistent with constructivist, learning theory, two (2) represented weak implementation, and one (1) represented no learner-centered theory. Individual self-report prompts were correlated with parallel items and factor analysis was used to develop factor scores on pedagogical characteristics. Becker reported as follows:

> A majority of individual teacher self-report prompt response variables correlated at least +.30 with the corresponding single OOQ (Objective Observer Questionnaire) variable. More than 1/3 of these single-item variables correlated at least +.40 with the OOQ single-item variable, and 15% of the variables correlated at least +.50 with their corresponding validation item (p. 10).

Becker further reported that "characteristics most visible and least dependent upon an analysis of classroom discourse have the greatest correlation between the observer-interview data and the teacher self-report data" (p. 16). In

addition, ". . . exploratory analysis revealed almost no empirical separation between belief-questions and practice-questions reflecting the same rationally derived category of pedagogy" (p. 10). Future analyses of the Becker study will include a more generic aggregation of the teacher self-report data and the validation information (p. 17).

Most questions in section A3 which asked teachers to identify assessment practices were modified from the Becker instrument. However, questions about portfolios and interviews/conferences were developed from the work of Cole, Ryan & Kick (1995) and Airasian (1991).

Questions about team teaching, represented in section B7, were developed and modified with permission from the framework of the Northern Nevada Writing Project Teacher-Research Group. Anderson, et al. (1996), conducted research to determine the effects on students and teachers using various configurations of team teaching styles. They reported that the ways of teaching curriculum were as varied as the teams and did not appear to be limited to the five choices used in this research.

The Scheingold (1995) study established the philosophical framework to study the relationship between the assessment practices and philosophies and the interdisciplinary collaborative teaching situation. Questions from section A3, C1, C3, and C4 respond to the five categories of change Sheingold has reported.

A pilot test of the survey instrument was completed prior to dispersion of the questionnaire to elicit information regarding ease of use and administration. Relevant problems and teacher comments from selected

teachers in this pilot, as well as from Dr. Beverly Ann Chin, NCTE past president, have provided the basis for final adjustments before the instrument was utilized.

Procedures

The first step was to identify the sample. As Creswell (1994) advocated, this study used a purposive or judgmental sample because potential respondents were chosen on the basis of convenience and availability. NCTE contact persons were asked to identify at least five, and as many as ten teaching teams or schools where teaching teams existed, who have been collaboratively teaching since at least August of 1997 (Appendix C). Although time constraints are somewhat arbitrary because some teachers will adapt to new situations more quickly than others, justification for the selected element of time has come from the work of Loucks, Newlove, and Hall (1975). They established that individual variations in the use of innovations form a predictable, developmental process requiring considerable time. Furthermore, Van Zandt & Albright (1996) have identified a number of curricular implementation models which suggest that developmental stages of interdisciplinary curricula take at least a year, but seem to be well underway by the third or fourth year.

The next step was to contact the teaching teams. With a cover letter (Appendix D), the instrument was mailed to the subjects early in September, 1998. Creswell (1994) has advocated a three-phase follow-up sequence. An initial mailing was followed by a second request after four weeks. A third mailing of a postcard as a reminder to complete and send the questionnaire

covered a total of six weeks. At the end of the sixth week, a final telephone call was made in an attempt to obtain the appropriate minimum number of cases to study.

The responding teaching teams were then identified in this study based upon constructs associated with specified teaching models and styles and with specified curricular structures. For example, teachers who indicate in the survey that they favored traditional lecture as an informational delivery method self-identified at one end of a continuum, while teachers who saw themselves as being more learner-centered in their teaching approach self-identified at the other end (Questions A1-A2). Fraenkel & Wallen (1990) have cautioned that the major threat to internal validity of a causal-comparative study results from groups with potentially extraneous variables other than those identified. This study controlled for extraneous variables by matching subjects based upon an established continuum. The continuum organized teachers from strongly teacher centered to strongly learner centered.

Finally, these teachers were identified based on their responses on a Likert scale in the survey which translated into the numerical expression of the continuum.

Analysis

Sheingold, et al. (1995) identified goals which guided the data analysis in this study. The first goal was to determine whether teachers would report change in assessment practices and philosophies which they attributed to the interdisciplinary team experience. The second goal was to characterize the

changes teachers reported. Essentially, teaching models and styles were considered along a continuum beginning with teacher-centered instruction and ending with learner-centered collaboration established by Drake (1993) and Adler & Flihan (1997). Assessment practices were identified beginning with fact reporting tests, such as short answer and multiple choice, and ending with performance assessments such as portfolios as identified in the questionnaire. The analysis characterized the major changes the teachers reported. Sheingold (1995) has described five categories consistent with the results of this study in which teachers reported:

1) using new sources of evidence to assess student performances,

2) how students took more responsibility for learning and assessment,

3) shifts in goals of instruction,

4) using new ways of evaluating evidence, and

5) a change in their view of the relationship between assessment and instruction.

A Kruskal-Wallis nonparametric test to analyze data from more than two independent groups of subjects provided information about sample scores with higher ranks than other samples. This study determined that a statistically significant difference of .05 alpha level on a one-tailed test of significance was appropriate when the H_1 is directional. The conclusion was that there was a statistically significant relationship between interdisciplinary practices and assessment practices.

CHAPTER FOUR

RESULTS

The purpose of this research was to explore relationships between interdisciplinary collaborative teaching practices and assessment practices of teachers in high school settings. This study asked teachers to report their beliefs and practices regarding teaching and assessment. The questions on the survey were selected from a national survey (Becker & Anderson, 1998) to represent both learner-centered teaching/assessment philosophies and more traditional teaching/assessment philosophies.

Research Overview

As Joyce & Weil (1986) have concluded, the Nondirective Teaching Model developed by Carl Rogers focuses on facilitating learning so that students attain greater personal understanding of knowledge. This learner-centered model characteristically uses peer group modeling and assessing, cooperative learning, problem solving, and performance learning. Conversely, Posner (1995) has explained that the traditional classroom is characterized by single subject matter, teacher-centered instruction employing lecture, and whole-group settings. While no attempt was made to apply value judgments to either learner-centered or teacher-centered practices, this research explored relationships between interdisciplinary team organizations and learner-centered or traditional approaches. Teachers were asked first to indicate their teaching and assessment philosophies and practices, and second, to report any changes in teaching and assessment practices they

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may have made during the duration of their interdisciplinary teaching.

This research investigated two questions about the relationships between teaching styles and assessment practices. Specifically, the study explored whether teachers reported utilizing learner-centered philosophies and teaching styles and practices in interdisciplinary classrooms or using teacher-centered (traditional) classroom models. The second question examined the extent to which teachers had changed their teaching/assessment practices as a result of their interdisciplinary experiences.

Procedure

A letter (Appendix E), followed by a phone call, asked designated contact persons of state affiliates of the National Council of Teachers of English (NCTE) in Region Seven to nominate, as subjects for this study, high school teachers who were working in teams of two or more in some form of interdisciplinary configuration. Although other discipline combinations were studied as part of the sample, teams were comprised primarily of teachers who had integrated English curriculum with another subject such as history, science, math, art, or another regular education curriculum. Affiliate NCTE contact teachers were asked to nominate for the study teachers who were known to plan, teach and assess together collaboratively, preferably in an alternative or block schedule. Although some states provided much more information than others, the teams to be studied were nominated by state affiliates from Montana, Oregon, Washington, Wyoming, Idaho, and Alaska.

Seventy-two surveys were subsequently distributed, along with a cover letter (Appendix F) on September 9, 1998. By October 21, follow-up postcards

had been sent to teachers who had not yet responded to the survey. By November 20, those teachers who had yet to respond had received telephone calls, as well as a second copy of the survey if they needed one.

<u>Profile of the Sample</u>

Fifty-four teachers ultimately responded for a 75% response rate. Seven responses were not used in the statistical analysis, including the responses from three teachers who reported no longer using any form of block or interdisciplinary activity; two teachers who reported that the instrument's questions did not offer choices which reflected their models; and two teachers in the first year of teaching who could not assess changes in their assessment practices because of a lack of experience. Nonetheless, a complete list of all written responses has been included (Appendix G).

All teachers responded individually to questions asked in the survey. While several responses indicated that other team members had also received the survey, it was not apparent how many team members actually responded from each team. Teachers indicated that they were members of teams which included two, three or four members, but the instrument did not solicit information identifying specific team memberships. The adjusted sample included 47 high school teachers with at least one full year of teaching who had experience in some form of team teaching. Utilizing information from the aforementioned sample, this chapter outlines the results of data analysis in responding to the research questions set forth in Chapter One.

Section B of the survey instrument sought demographic data, as well as information regarding teaching experiences and practices. These included

questions about the number of years teachers had been teaching full time,

how many years they had teamed with their current partner(s), what subjects

they had taught, and how many hours they had worked with any partner.

Figure 4.1 shows that this sample of interdisciplinary teachers had a

range of teaching experience from two years to thirty-four years, with twenty

Figure 4.1
Number of Years Teaching N=47

Number of Years as a Full Time Teacher
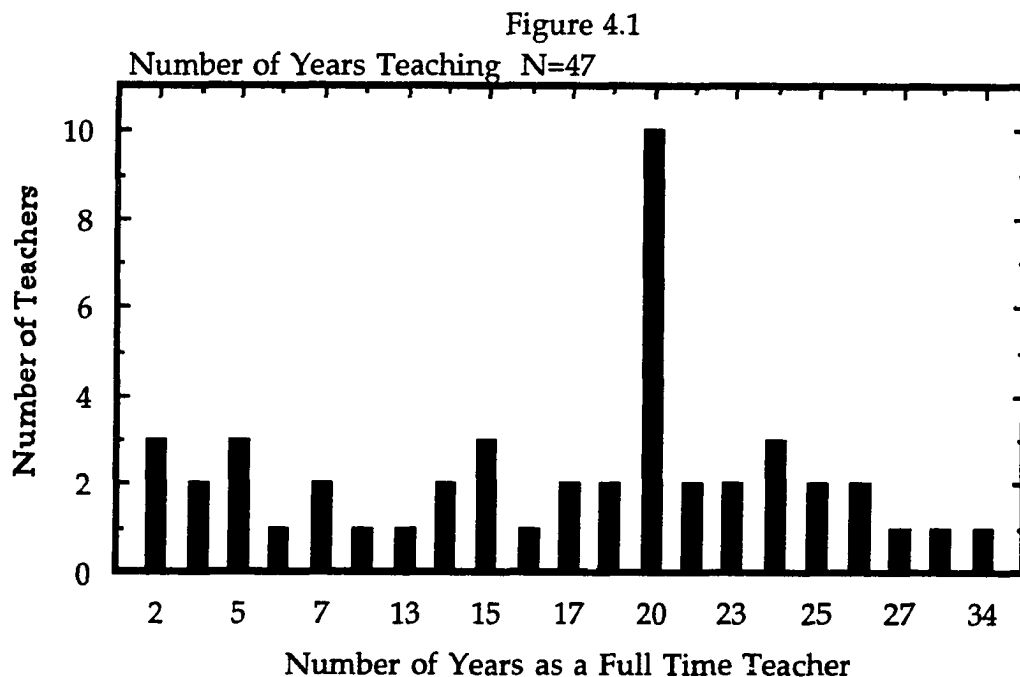
year veterans constituting the largest block of the sample. Frequency

distributions indicate that of the adjusted sample of forty-seven teachers

included in the statistical analysis, 51% had twenty or more years of teaching

experience. Of the total fifty-four responses, ten teachers reported five or

fewer years of teaching experience. For the purpose of identification in

reporting this research, teachers who reported more than five years of

teaching experience have been identified as veteran teachers. Most teachers

who responded to this survey would be considered veteran teachers, or teachers who had more than five years of teaching experience. Because of the small numbers of teachers with limited experience, no comparisons could be made between veteran teachers and less experienced teachers in measuring changes in assessment practices.

Grade Levels Taught

Question B2 asked teachers to list the grade levels they team taught. Even when teachers indicated a current level of team teaching, they often indicated that they had taught several levels (9-12) as individual classes at some time in their teaching careers. Many of the teachers indicated that they were team teaching more than one grade level, but it was not always clear what grade level they were currently teaching in an interdisciplinary situation. However, twelve teachers reported team teaching grade eleven, while eleven teachers reported teaching grade ten. Fifteen teachers reported that they taught grades nine through twelve, but did not indicate which levels they team taught. Four teachers reported that they taught grade twelve, while four more reported team teaching grades ten and eleven. One teacher indicated that her team's interdisciplinary class was open to all students, grades ten through twelve.

Team Teaching Experience

Team teaching was defined for this study as teaching characterized by teachers developing, planning, and implementing integrated curriculum together (Maurer, 1994). Figure 4.2 shows the number of years teachers

reported that they had engaged in team teaching situations. Of those teachers

responding, 66% indicated five years or less of team teaching experience,

while only 9% indicated that they had been team teaching for ten years or

more. In their written responses, teachers further reported a variety of

Figure 4.2
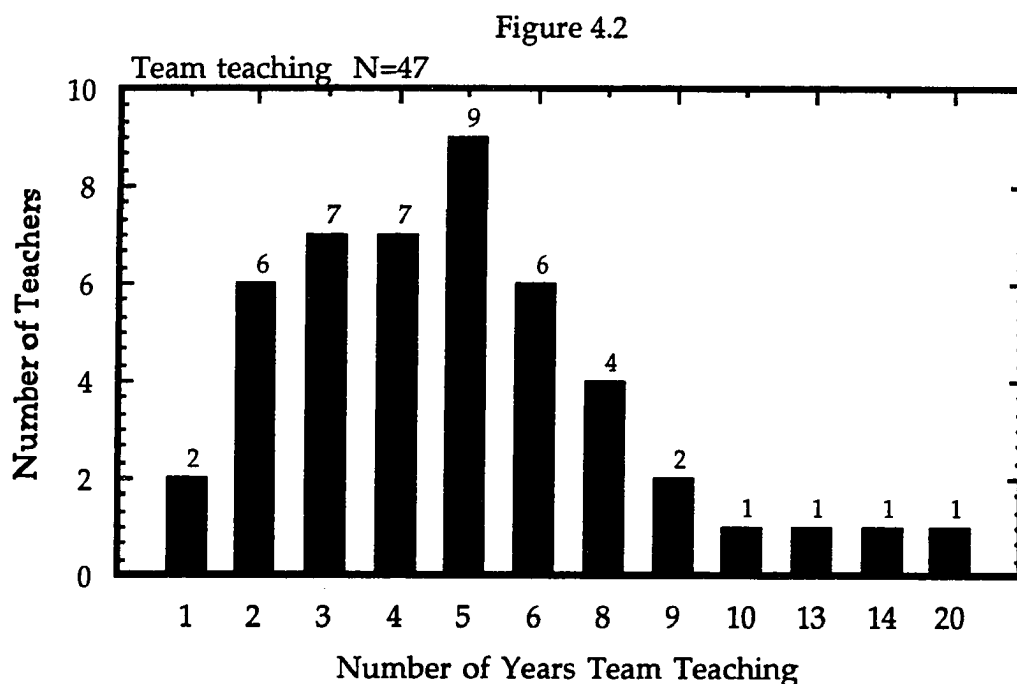
elements to be part of their team teaching. For example, a teacher from

Alaska wrote: "Our program is multi-grade, multidisciplinary project-based

teaching, so we have project cycles wherein students, working in groups,

work together to answer the essential question." Another teacher indicated

that his team taught each other first, then divided students into four "tutor

groups." A teacher from Wyoming wrote: "We have a problem-based

program. Our role is one of problem-based tutor, not that of teacher." These

remarks delineate selected special features associated with several of the

respondents' teams who attempted to define more clearly their teaming

practices. Nonetheless, the majority of the teachers identified their work as team teaching based on the instrument's labels.

Current Partner Teams

Question B4 asked teachers to report the number of years they have been teaching with a current partner. Figure 4.3 displays frequency distributions of the number of years reported. More than 61% of the teachers reported team teaching with a current partner for three or fewer years, while 21% reported having the same partner for five or more years.

Figure 4.3
Years with Current Partner N=47

Number of Years Team Teaching with Current Partner
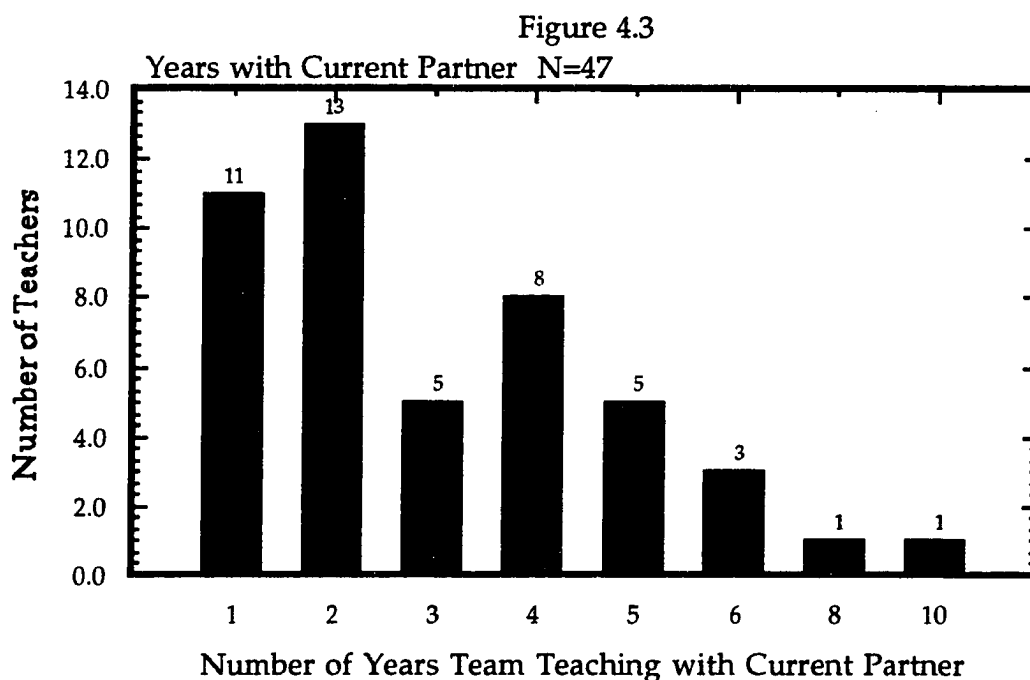
Teachers reported teaming with a current partner for fewer years than they had been teaching or teaming altogether. One teacher indicated that his team was assigned administratively and that he had no say in partner choice,

but others indicated at least some input into the formulation of these teams. A teacher who had been teaching for twenty-three years including two different team teaching experiences reported dissatisfaction with her most recent partner. She reported that she was not currently teaming, adding: "My team partnership worked well the first year. The second year was a disaster. Our styles of teaching and communication skills were very different." Another teacher, who had been teaching for three years and team teaching with a current partner for two years, wrote: "Our hope is that the longer we team teach together, the more we will be able to both give direct instruction to the whole group interactively."

Other teachers reported innovative attempts to team teach under restrictive conditions. One teacher wrote: "Because of physical limitations we have difficulty getting the whole class together—frequently, we each teach half the group, but we are careful to be sure the content relates." One veteran teacher with both high school and college teaching experience, who has been team teaching for four years with a former student, reported a high degree of satisfaction and success with team teaching. She indicated that her partner and she were "...very good together." These and other remarks recorded in Appendix G support the literature suggesting that team organization and relationships are important in successful interdisciplinary experiences (Panaritis, 1995; Lounsbury, 1992; Maurer, 1994).

The majority of teachers who participated in this study about the use of learner-centered teaching and assessment practices had twenty or more years of teaching experience. These veteran teachers also indicated that team teaching was a relatively new experience for them, yet they seemed content to

be leading the way in exploring the practices of learner-centered teaching and assessment.

Subject Analysis

Question B5 asked teachers to indicate what subject or subjects they team taught. Responses to this question were sometimes ambiguous regarding the specific combination of classes they currently teach. Figure 4.4 provides the frequency distribution of the subjects.

Figure 4.4
Subjects Currently Team Taught N=46

Subjects Currently Team Taught
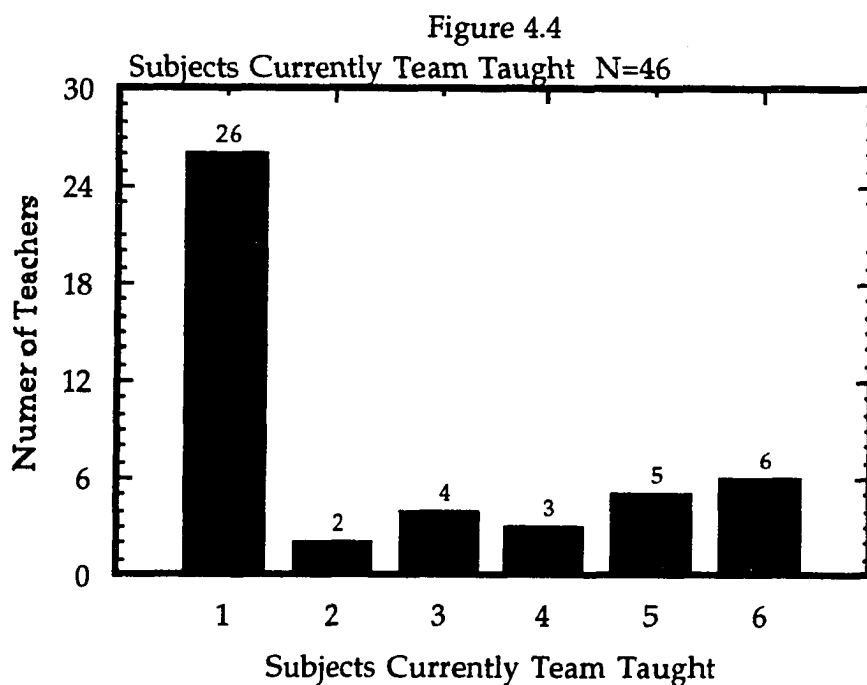
1=English and history
2=English and another unknown subject
3=English and science
4=Unspecified science and math
5=Team of four teachers and four subjects
6=Other

In Figure 4.4, the number one (1) represents some combination of English and history, characterized most often as either American literature and history for juniors or world literature and history for sophomores. The number two (2) represents some combination of English and another subject not clearly identified. The number three (3) represents some combination of English and a science such as biology or chemistry. In these classes, teachers reported that student research was the focal point of the interdisciplinary activity. The number four (4) represents an unspecified combination of a science class (e.g., chemistry) and math. The number five (5) represents those teachers who indicated that they team teach with more than one other teacher in some combination of English, math, history, and science. These teachers in group five (5) reported the most complex organizational designs. Finally, the number six (6) represents an unspecified combination.

Of the responses, 56% reported teaching some combination of English and history, 4% reported some combination of English and some other subject such as music or art, 9% reported some combination of science such as biology and English, 7% reported some combination of math and science, and 11% reported a four or five person team where science, math, social studies, English, and a computer/technical combination were all taught together. Finally, 13% reported some other combination such as television media, music and art, or a nutrition and fitness class the teachers identified as "Shake and Bake."

Preparation Time Analysis

Question B6 asked teachers to indicate the number of hours each week spent in planning lessons with a partner. As Figure 4.5 indicates, 25% of the teachers reported that they plan together one hour each week. Thirty-eight percent reported planning together two or three hours each week. Another 30% reported planning four or five hours together during the week.

Figure 4.5
Hours Lesson Planning with Partner(s) N=47
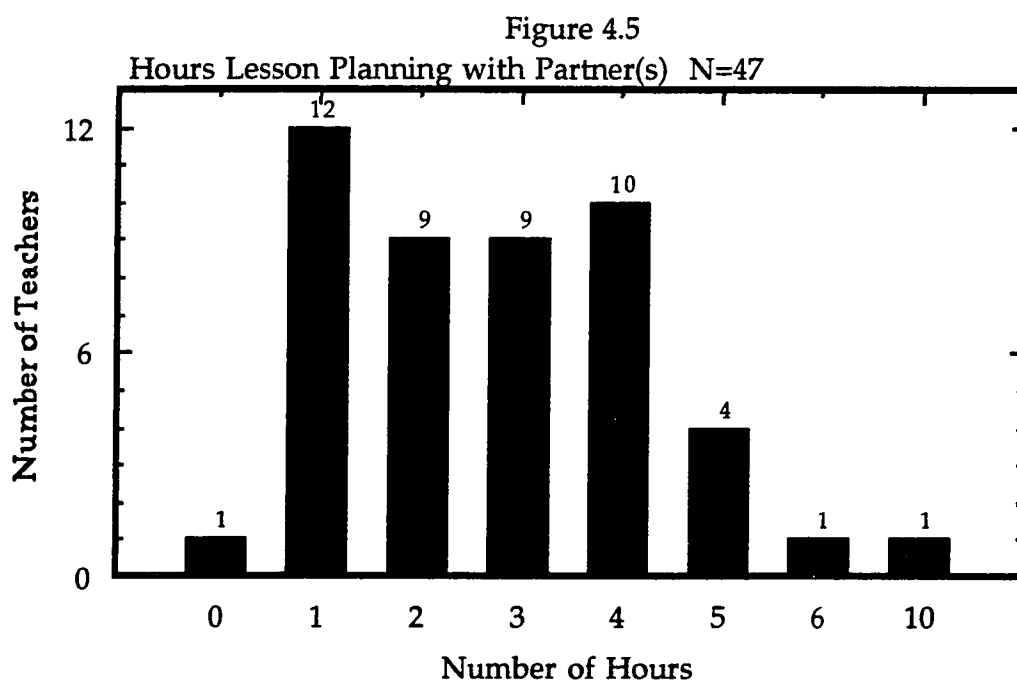
One teacher reported having no time to plan with partners, stating: "We don't have a common prep and we don't live in the same town. Our teaching relationship is based on trust." Another teacher reported working together with partners ten hours each week. One teacher reported typical planning as being no specific time, but rather brief discussion in the hallway between classes. She explained that they plan "a few minutes here and there when we can get it." Another teacher reported that they "...do unplanned intensives."

It was clear that most teachers considered lack of time to plan as a significant problem. Most indicated that they could do a better job if they had more planning time. One teacher mused that "planning time--dependable and regular--could be an amazing experience." Nonetheless, preparation time did not seem to be a concern in teams' levels of creativity or innovation.

Teaching Philosophy and Practices

Philosophical Results

Responses to Section A of the instrument provided information about each teacher's basic teaching philosophy as it related to their beliefs about how students learn. Section A1 asked teachers to agree or disagree, on a Likert-type scale of one through five, regarding statements concerning how students learn best. Table 4.1 represents the frequencies of teacher responses to questions A1 a-g.

Table 4.1

Teacher Responses to Statements About Teaching and Learning N=47

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
A1a-Students should "muddle"	34%	44%	16%	2%	4%
A1b-Quiet is good for learning	28%	49%	15%	6%	2%
A1c-Need clear correct answers	28%	49%	17%	6%	0%
A1d-Build instruction around easy ideas	32%	45%	17%	6%	0%
A1e-Teaching facts is necessary	21%	38%	18%	21%	2%
A1f-Projects result in wrong knowledge	28%	43%	8%	15%	6%
A1g-Students should help build assessment tools	6%	9%	18%	58%	9%

Teacher responses were indicative of how philosophically traditional or learner-centered they were. Question A1a asked teachers to indicate how much they agreed or disagreed with the statement that teachers know more than students and that they should not let students "muddle" around when they can just explain the answers directly. One teacher from Montana disagreed and then wrote: "If muddle means to confuse through purposely diverting the discussion to kill time, then the teacher has the obligation to refocus the discussion. If muddling occurs through student inquiry and input which is well-meaning and on topic, but nevertheless confuses, then that discussion should be allowed as a means to clarify. Obviously student involvement is critical and the teacher as lecturer should be long gone." Adler & Flihan (1997) have identified problem-centered curriculum as reconstructed and therefore highly learner-centered. This teacher indicated that the term "muddle" might infer more than one meaning.

Statement A1b asserted that a quiet classroom is generally needed for effective learning. This question asked teachers to agree or disagree with a highly teacher-centered statement. Becker & Anderson (1998) have identified active learning, peer interactivity, and peer discourse as learner-centered. These interdisciplinary teachers disagreed (at a rate of 77%) that effective learning happens only in quiet classrooms, thus suggesting that teachers' practices and beliefs in this study were learner-centered.

Statement A1c suggested that instruction should be built around problems with clear, correct answers. Again, Becker & Anderson (1998) have found that higher-order competencies such as problem-solving, critical thinking, and ambiguous reality were characteristics of a learner-centered

classroom. Seventy-seven percent of these teachers disagreed with this statement, as well as with A1b. Here, too, these responses indicated a strong affinity for learner-centered ideals.

Statement A1d asked teachers to agree or disagree that instruction should be built around ideas easily and quickly understood by students. Again, 77% of the teachers disagreed. One teacher who disagreed wrote, "... ultimately the goal is that they grasp the key concepts, but that may not be accomplished quickly or easily." Becker & Anderson (1998) have identified the learner-centered teacher as someone who pays careful attention to the learning process, as well as to how students come to new understandings, rather than to the methods of presenting the material. Similarly, these teachers indicated a strong learner-centered ideal.

Statement A1e stated that how much students learn depends on how much background knowledge they have; therefore, teaching facts is necessary. Teachers in this study were less decisive regarding their views on this question. Teachers either strongly disagreed (21%), disagreed (38%) or were neutral (18%). The characteristics of the learner-centered response identified by Becker & Anderson (1998) are that instructional tasks, such as the learning of skills and facts, should be performed as part of an integrative activity rather than in isolated practice. One teacher wrote: "Using an inquiry–based model with a great deal of independent research, I have come to the conclusion that background knowledge is important to developing the questions for more independent research. The front-loading is more important than I once believed, but it should not be the major time absorber." Other teachers indicated that their beliefs regarding this statement were "situation

dependent."

On statement A1f, which asserted that student projects may result in students learning inaccurate or incomplete knowledge, 71% of the respondents disagreed. Again, Becker & Anderson (1998) found that student projects were identified as characteristic of learner-centered classrooms. One teacher, agreeing with this statement, wrote: "Yes, but benefits outweigh limitations. Student projects often result in inaccurate information due to the novice nature of students' research discrimination skills. Those are teachable moments. The incomplete nature of their knowledge is also to be expected and true of all knowledge bases. I strongly support and use student projects/research in spite of these limitations." Clearly, like-minded responses to A1f indicate learner-centered beliefs and practices.

The final statement, A1g, suggested that students should help establish the criteria upon which their work will be assessed. Sixty-seven percent of the teachers agreed and 18% were neutral. Becker & Anderson (1998) identified student choice, where students have some authority to select topics, and meta-cognition, where students are involved in assessments of self and peers, as characteristics of learner-centered classrooms. One teacher's class "designed a portfolio system that left class time totally assessment free until the end of the term. All time was devoted to delight and learning. The portfolios showed it too."

While A1a-f were all written in such a way that learner-centered teachers could be expected to disagree, A1g was selected to test the internal validity of teacher responses. Teachers exhibiting a learner-centered response by disagreeing in A1a-f needed to respond in a converse manner by agreeing

to the A1g statement in order to be consistent with earlier responses. Teachers in the study indicated clear philosophical and practical responses consistent with learner-centered theory.

In order to assess teaching philosophies more specifically, section A2 asked teachers to indicate which statement from a pair came closest to describing their respective individual teaching philosophies. The statements offered two opposite traits on a continuum stretching from highly learner-centered to traditional or highly teacher-centered. Questions A2 a, d, and e began with the learner-centered statement, while questions A2 b, c, and f began with the more teacher-centered statement. A frequency distribution in Table 4.2 indicates how this group of teachers responded.

Table 4.2

Frequency Distribution of Teachers Responses to Questions in Section A2

	Learner-Centered ◄► Traditional				
	1	2	3	4	5
A2a-Discovery or lecture	44%	30%	22%	2%	2%
A2b-Content or "sense-making"	21%	32%	39%	6%	2%
A2c-Coverage or depth	2%	32%	19%	32%	15%
A2d-Value of student interest	21%	53%	20%	6%	0%
A2e-Team interactive instruction	38%	38%	20%	4%	0%
A2f-Curriculum responsibilities	47%	21%	15%	15%	2%

Table 4.2 has been designed to indicate the responses ranging from most learner-centered philosophy to the strongest traditional or teacher-centered philosophy. For example, 74% of the teachers reported that their beliefs more closely aligned with this statement (A2a): "I mainly see my role as a facilitator. I try to provide opportunities and resources for my students to discover concepts for themselves." Although 22% were neutral, 4% indicated

alignment with this opposing statement: "Students really won't learn the subject unless you go over the material in a structured way. It's my job to explain, to show students how to do the work, and to assign specific practice."

Question A2b asked teachers to identify their beliefs regarding learning and teaching. The first statement suggested content of the curriculum as the most important issue for teachers and learners to address. Its opposing construct suggested "sense-making" or thinking as the most important issue. Teachers' responses resulted in 53% being highly learner-centered, while 39% remained neutral. Teachers offered no comments for further clarification on this section.

In question A2c, 32% of the teachers were most closely aligned with the following teacher-centered statement: "It is useful for students to become familiar with many different ideas and skills even if their understanding, for now, is limited. . . ." Another 32% were most closely aligned with the following learner-centered statement: "It is better for students to master a few complex ideas and skills well, and to learn what deep understanding is all about, even if the breadth of their knowledge is limited until they are older." Fifteen percent remained neutral on the question. Teachers selected the learner-centered statements as indicative of their teaching philosophies, even from choices which tended to be ambiguous within A2c.

On question A2d, 74% of the teachers checked the learner-centered response, suggesting interest and effort or student motivation as more important than the subject matter on which students were working. One teacher wrote: "Inspired minds can bring stronger and clearer power to [academic] focus." Of the remaining 26%, most were neutral while 6%

indicated slightly more teacher-centered alignment.

Question A2e asked teachers to report whether the team gave direct instruction to the whole group interactively; or whether individuals took turns being lead teacher while the other person completed separate tasks such as grading papers or planning lessons. Seventy-six percent of the teacher responses again indicated that their team teaching ideal was interactive teaching rather than single teacher sessions. One teacher indicated that the team had no preparation period, and therefore did some single teaching: "We are actually sacrificing a prep period to teach collaboratively. We have had little support from our administration, therefore we do need to take some time occasionally."

A2f asked teachers to indicate how extensively they collaborated with team members during instructional planning. Sixty-eight percent of the responses indicated that teachers were more collaborative and thus more learner-centered than traditional. Those teachers who reported that they had resorted to parallel teaching were more closely aligned with traditional models. They would be represented at stage one (correlated knowledge) on the Adler & Flihan (1997) interdisciplinary continuum (See page 19).

Responses varied among stage one (correlated knowledge), stage two (shared knowledge), and stage three (reconstructed knowledge), depending on what teaching or assessment practice the question probed. Teachers reported parallel teaching, for example, as being a teaching response to a situation which did not facilitate more blended practices.

Teaching Philosophy on Assessment

Section A3 asked teachers to indicate which assessment practices they believed were useful in judging how well students learned. Table 4.3 depicts the distribution of these responses.

Table 4.3

Teaching Philosophy as it Applies to Assessment

	1 Not Useful	2 Slightly	3 Moderately	4 Very	5 Essential
A3a-Objective test questions	14%	23%	54%	10%	0%
A3b-Essays	0%	4%	11%	51%	34%
A3c-Open-ended problems	0%	0%	7%	61%	32%
A3d-Individual projects	0%	0%	17%	45%	38%
A3e-Group projects	0%	0%	26%	38%	36%
A3f-Standardized tests	26%	48%	17%	7%	2%
A3g-Oral presentations	0%	0%	15%	49%	36%
A3h-Portfolios	3%	7%	20%	50%	20%
A3i-Interviews/conferences	0%	11%	28%	37%	24%
A3j-Peer assessments	2%	21%	47%	28%	2%
A3k-Self-assessments	2%	6%	30%	49%	13%

Table 4.3 depicts the results of items from the Becker & Anderson (1998) teacher questionnaire. These questions, adapted from Becker & Anderson, were designed to study teaching philosophy as it applied to assessment practices. Responses indicate that 54% of the teachers ranked objective test questions such as true/false, multiple choice, matching, and fill in the blank as moderately useful, but not at all essential. Teachers further reported that assessments such as essays, open-ended problems, individual projects, group projects, and oral presentations (A3 b, c, d, e, and g) were more

useful than some others such as objective tests and standardized tests (A3a and f). For example, open-ended problems (those with more than one solution and/or more than one correct answer) were ranked by 61% of the teachers in this study as "very useful" and by 32% of these teachers as "essential." Essays received the next highest ranking, with 85% of the teachers deeming them "very useful" or "essential." Standardized testing was ranked by 48% of the teachers as "slightly useful," while 26% ranked standardized tests as "not useful."

Portfolios, interviews/conferences, and peer/self-assessments (A3 h, i, j, and k) received more mixed reviews. Seventy percent of the teachers found portfolios "essential" or "very useful," and 11% found them "slightly" or "not useful." While 2% of the teachers said peer assessments were "essential," 47% said they were "moderately useful" and 28% reported that peer assessments were "very useful." Self-assessment fared somewhat better, with 13% of the teachers reporting this form of assessment "essential" in judging student learning, while 79% thought it to be "very useful" or "moderately useful."

A math teacher from Alaska, indicating that objective test questions were very useful, wrote: "Answers will vary according to subject matter." One teacher from Washington, who has been teaching more than twenty years, described how, in specialized projects, her students each created from thier research a persona of a historic figure. Students then reported their information by "unpacking a trunk," where they literally unpacked luggage as they explained who their historic figures was and such figures contribution to literature and/or history.

Teaching Styles of Interdisciplinary Teachers

Questions B7 asked teachers to indicate how often teachers used certain teaching styles. Dual-directed teaching (B7a) is a style in which both partners give direct instruction to the class interactively. Alternating as lead teacher (B7b) suggests that each partner gives direct instruction at times while the other partner acts as a helper, reinforcer or note keeper, or is otherwise engaged. Teaching the same subject in small groups (B7c) allows partners to move about the classroom working separately but on the same subject. Teaching small groups different subjects (B7d) allows teachers to move about the same classroom, or even move groups into separate classrooms in order to teach different subjects, primarily along specialization lines. The lead teacher role (B7e) suggests that one teacher provides the direct instruction, while the partner assumes a very passive role in the classroom. Here the partner is not typically engaged in active participation except as a helper. Frequency distributions of teacher responses to this series of questions are reported in Table 4. 4.

Table 4.4

Teaching Practices Frequency Distribution

	1 Never	2 Sometimes	3 Often	4 Very Often	5 Always
B7a-Dual-direct	7%	48%	15%	24%	6%
B7b-Alternate lead	7%	39%	26%	26%	2%
B7c-Same subjects	33%	37%	23%	4%	3%
B7d-Different subjects	15%	19%	9%	51%	6%
B7e-Leader or helper	36%	44%	13%	7%	0%

This table indicates that teachers used many variations of teaching practices

specific to certain instructional situations. For example, 48% of the teachers indicated that they sometimes used dual-direct teaching; 39% reported that they sometimes used alternating as lead teacher; 37% sometimes used a style where both were teaching small groups the same subjects; and 44% said they sometimes used a style where one teacher generally assumed the lead role while the partner worked as the helper. Of the teachers who responded, 51% noted that they very often used a style where both teachers taught small groups different subjects.

Teachers indicated many reasons for using teaching practices which they acknowledged as inconsistent with their teaching philosophies. For example, one teacher, who indicated that on her team both teachers very often taught different subjects to small groups, wrote: "We would integrate more often if class size was smaller. We have a block of 50 students in one classroom--too crowded--we have split in two. We combine the activities and culminating research projects." One, who indicated that the team very often used dual-direct teaching, wrote: "Our hope is that the longer we team teach together, the more we will be able to both give direct instruction to the whole group interactively."

Another teacher, who indicated that the team sometimes used dual-direct teaching and very often taught different subjects to small groups, wrote: "Because of physical limitations we have difficulty getting the whole class together. Frequently we each teach half the group, but we are careful to be sure the content repeats." Another teacher, who reported that the team never used dual-directed teaching, wrote: "We have a problem-based program. Each tutor works with small groups on an interdisciplinary, messy, real problem.

Our role is one of problem-based tutor, not that of a teacher." Class size, time spent teaching with a partner, physical limitations of the facilities, and very progressive teaching styles were the four most frequently-written comments regarding teaching styles.

Assessment Practices

Section C asked teachers to indicate the type of assessment practices they used. The first question in this section (C1) asked teachers to reflect on how much they have changed their teaching practices over the last three years. As Figure 4.6 indicates, teachers predominantly stated that they have changed "moderately" to "very much" with regard to assessment practices over the past three years.

Figure 4.6

Assessment changes N=47

Legend: Reported Changes in Assessment

1=No changes   2=Slight changes
3=Moderate changes   4=Changed very much
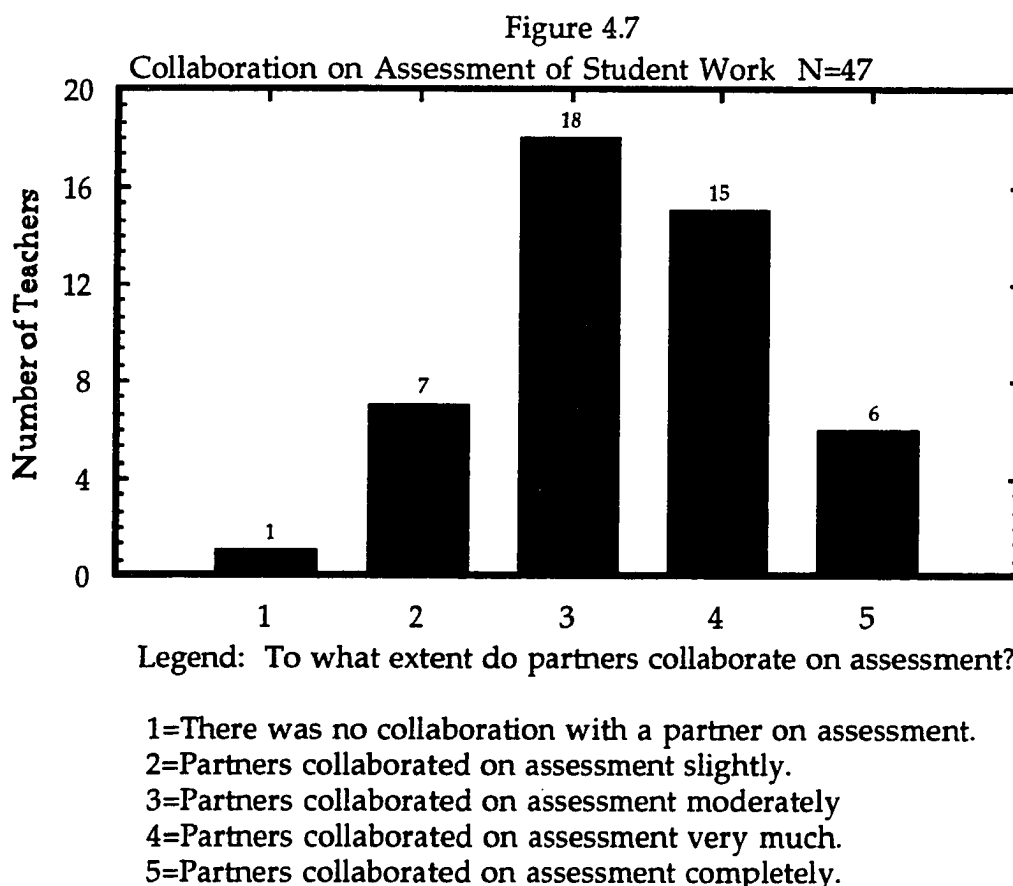5=Assessment practices have changed completely
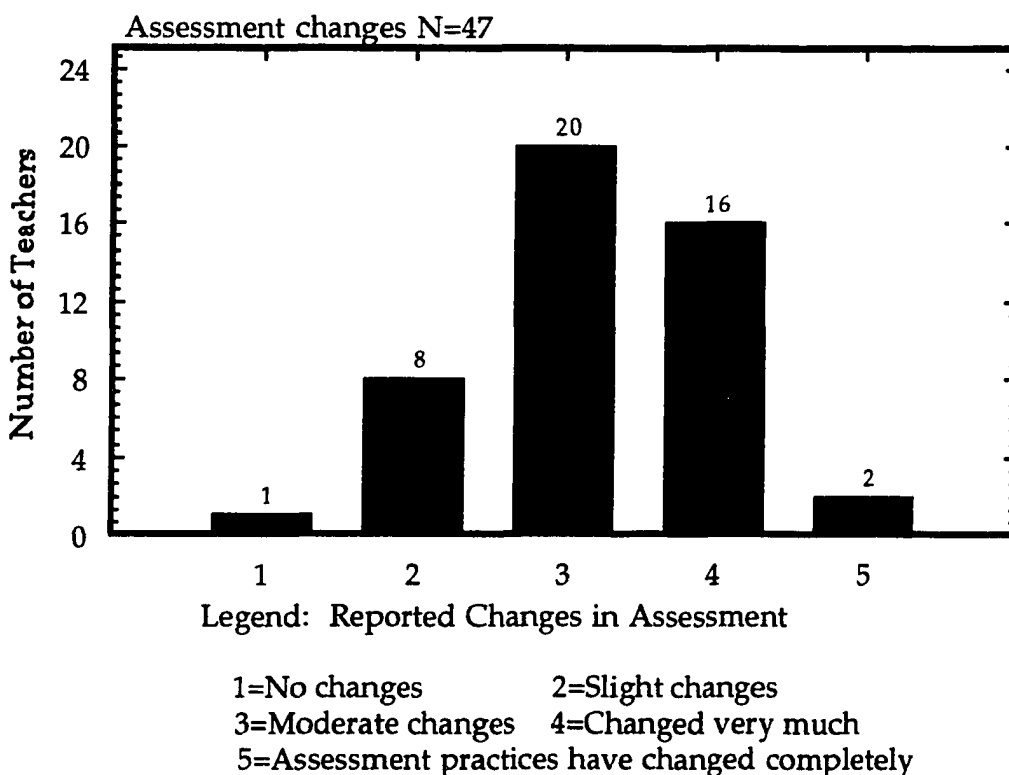
Of these teachers responding, 43% indicated that they had changed assessment practices "moderately" over the last three years, while 38% reported they had changed assessment practices "very much" or "completely" over the last three years. Teachers who reported "slight" or "no change" indicated that they too, had made changes, but that the changes had occurred in the last five to ten years rather than in the last three years. Teachers who reported changes in assessment practices also attributed those changes to interdisciplinary structures and curricula. For example, one teacher, who reported that she had changed assessment practices "moderately," wrote: "We do more standards based authentic assessment." Other teachers reported that their assessments were now "totally different" or that they looked more for "holistic responses."

Collaborative Assessments

Question C2 asked teachers to rate the extent to which they collaborate with a partner on the assessment of student work. All teachers indicated at least some collaboration in assessment of student work. Written responses from teachers reflected the need reported in the literature (Panaritis, 1995; Raywid, 1993) for more time to plan and assess. For example, one teacher from Montana, who reported "moderate" collaboration, wrote: "When grading projects, we have developed a grading scheme. We each grade each project separately and then we collaborate." Another teacher, who reported that his team collaborated "moderately," reported using a team rubric to assess major projects. Two teachers who did not complete the assessment portion of the survey indicated that they collaborated with partners on the assessment of student work. Finally, a teacher from Washington

wrote: "We can set or gather scoring criteria together and share concerns. We split the paper load often according to our subject matter interests." Figure 4.7 indicates that 38% collaborate "moderately" with a partner on the assessment of student work; 32% collaborate "very much" with a partner on the assessment of student work; and 13% collaborate "completely" with a partner on the assessment of student work.

Figure 4.7

Collaboration on Assessment of Student Work   N=47

Legend: To what extent do partners collaborate on assessment?

1=There was no collaboration with a partner on assessment.
2=Partners collaborated on assessment slightly.
3=Partners collaborated on assessment moderately
4=Partners collaborated on assessment very much.
5=Partners collaborated on assessment completely.

Clearly, collaboration regarding assessment of student work with a partner was somewhat dependent upon specific teaching situations. For example, one teacher indicated on the instrument that there was no collaboration, but wrote: "We can set or gather scoring criteria together and share concerns."

<u>Interdisciplinary Teaching and Assessment Practices</u>

Question C3 asked teachers to report the extent to which

interdisciplinary team teaching had changed their assessment practices.

Figure 4.8 demonstrates that interdisciplinary team teaching experiences had

a major impact on assessment practices.

Figure 4.8

Changes in Assessment Attributed to Interdisciplinary Team Teaching
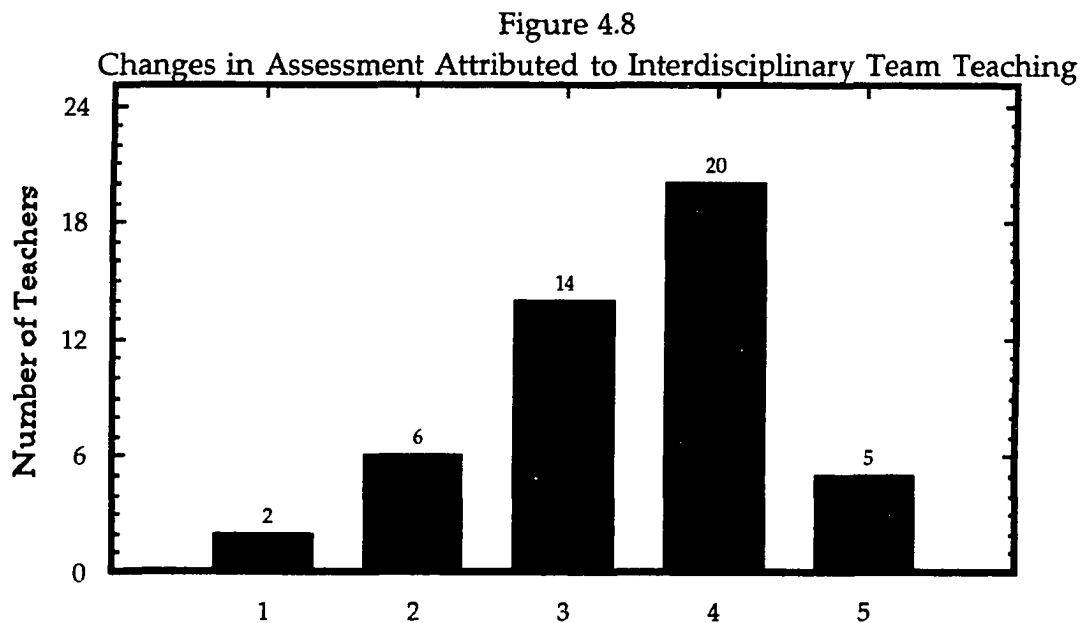
Legend: To what extent has interdisciplinary team teaching
changed assessment practices?

1=None
2=Slightly attributed
3=Moderately attributed
4=Very much
5=Completely

Of the 47 teachers responding to this question, 43% said that interdisciplinary

team teaching changed their assessment practices "very much," while 11%

indicated that the interdisciplinary teaching experiences had changed their

assessment practices "completely." Many teachers indicated that the

interdisciplinary activities provided more opportunities for them to use

different assessment practices. One teacher, who indicated that interdisciplinary teaching had only "slightly" altered her assessment practices, wrote: "My significant shift came nine years ago in working with Rick Stiggins. . . ." Another teacher, who indicated that interdisciplinary teaching had changed assessment practices "very much," reported: "As a history teacher, I found myself using essays and speeches as assessment tools." Another teacher indicated that the team used "more group work, peer assessment and collaborative assessment."

A teacher from Oregon, indicating that the assessment practices used by the team translated to the self-contained classroom, explained: "My assessment practices constantly evolve. My fundamental philosophy works for me in self-contained as well as integrated courses." One teacher summarized her response with the following statement: "After 17 years in a traditional classroom, the opportunity to teach secondary students in an interdisciplinary setting has changed my practice completely." Finally, a teacher from Wyoming wrote: "Assessment is not just a measure of learning: it has become a way to plan interventions, enrichment, future growth. It is a benchmark and a planned opportunity for self-reflection."

Changes in Teaching Experiences Which Altered Assessment Decisions

Questions in C4 asked teachers to indicate what experiences during their teaming tenure precipitated changes they may have made in assessment decisions. This set of questions provided internal validity to the study by considering other reasons teachers might have changed assessment practices.

Table 4.5 provides a frequency distribution summary.

Table 4.5

Reasons Attributed to Changes in Assessment Practices

	No Change	Not a Reason	Minor	Moderate Reason	Major
C4a-Changes in subjects or grades	32%	28%	13%	15%	13%
C4b-District policies /expectations	36%	23%	30%	11%	0%
C4c-Changes in climate at school	19%	23%	15%	32%	11%
C4d-Changes in ability of students	21%	23%	17%	28%	11%
C4e-Staff development experiences	16%	15%	28%	28%	13%
C4f-Discussions with colleagues	8%	13%	30%	30%	19%
C4g-Changes in goals	10%	4%	19%	46%	21%
C4h-Understand how people learn	13%	4%	17%	38%	28%
C4i-Opportunity to team teach	11%	4%	21%	28%	36%
C4j-Alternative or block scheduling	10%	13%	21%	26%	30%

Teachers were asked first to consider if there had been any changes in their teaching experience, then to consider whether the suggested change offered on the survey was a reason for possible changes in assessment. Finally, they were asked to determine whether that experience could be responsible for changes in their assessment practices. On C4a, 31% of the teachers responded that there had been no changes in subjects or grades taught, and 28% wrote that this was not a reason for changes they made in assessment. The 41% of the teachers who attributed changes in assessment to changes in subjects or grades taught, 13% reported minor reason; 15% reported moderate reason; and 13% reported a major reason for making changes in their assessment practes.

On district policies/expectations (C4b), 36% of the teachers cited

no change in this experience, and 23% found no a reason for their having made assessment changes. Only 11% indicated that district policies and expectations were a moderate reason, while 30% indicated that changes in district policies played a minor role in their changes in assessment practices.

Teachers considered changes in climate or emphasis at their schools (C4c) as a bit more influential than district policies. While 19% reported no changes in climate at their school, 23% indicated that climate was also not a reason for making changes in assessment. However, 32% considered climate to be a moderate impetus, and 11% thought it was a major one. One teacher, who reported changes in climate at her school as a major reason for assessment decisions, cited a school philosophy emphasizing the teachers' desire for students to be independent, life long learners who could get out of their seats and be noisy. In their individual comments several teachers indicated their wish for more time, but again, they did not indicate that this lack of time influenced their assessment decisions.

Twenty-one percent of the teachers reported no changes in ability or prior achievement of their students (C4d), and 23% reported that neither achievement nor ability was a reason for changes in assessment practices. Seventeen percent of the teachers thought changes in student ability played a minor role, while 28% thought changes in student ability and achievement played a moderate role. Eleven percent reported changes in their abilities or prior achievement levels of their students as a major reason for changes in assessment practices.

The staff development and workshop experiences teachers may have had (C4e) did not influence 31% of these teachers in their decisions about

assessment, but 56% cited staff development as either a minor or a moderate influence on their assessment changes. Another 13% reported that staff development and workshop experiences were a major influence on assessment decisions. More than half the teachers reported attending some sort of staff development which contributed to their assessment practice changes.

Discussions with colleagues at school (C4f) did not contribute to assessment decisions for 21% of the teachers, but 56% of the teachers reported that colleague discussions contributed at least moderately to assessment changes. Finally, 19% viewed discussions with colleagues as major influences in the changes they made. For these teachers, discussions with colleagues impacted assessment decisions more than district policies and expectations.

On question C4g, sixty-seven percent of the teachers reported that personal changes in the main goals these teachers had for students were "moderate" or "major" reasons for their having made changes in their assessment practices. One teacher reported having learned to place more value on student participation and effort than he had done earlier in his teaching career. "No change" or "not a reason" were the responses for only 14% of the teachers. Teachers who have been team teaching for five years or less seemed to experience shifts in goals they had for students, which tended to be consistent with their aforementioned changes in assessment practices and teaching styles.

Teachers also experienced changes in their understanding of how people learn or come to comprehend new concepts (C4h). A teacher reported that "the brain research is very persuasive." Sixty-six percent of the teachers

reported this change as being a "moderate" or "major reason" for their change in assessment practices, while 13% reported "no change" in their understanding of how people learn. In responding to C4i, sixty-four percent of the teachers cited the opportunity to team teach as a moderate or major reason they attributed to changes in assessment practices. One teacher wrote that team teaching in an interdisciplinary classroom gave an "infinite number of possibilities" and was a "boon for students and teachers." Another experienced teacher noted: "After 17 years in a traditional classroom, the opportunity to teach secondary students in an interdisciplinary setting has changed my practice completely." In responding to C4j, fifty-six percent of the teachers cited alternative or block scheduling as a "moderate" or "major reason" for changes in assessment practices. One twenty-year teacher, who indicated that block scheduling had been a major reason for changes in assessment decisions, then added: "I would be hesitant to teach in a block again without being positive that we are compatible in styles and goals." Another teacher expressed reservations, reporting that the four period day impedes true interdisciplinary team teaching. Similarly, a third teacher indicated that block scheduling, described as four ninety-minute periods, had been a big mistake academically, but resulted from budget cuts.

Hypothesis Testing

A summary of the findings concerning the pedagogical beliefs and teaching styles/assessment practices of interdisciplinary teachers provides the framework for the final conclusions and recommendations in Chapter Five. The first question investigated the relationship between pedagogical beliefs

interdisciplinary teachers reported and the teaching styles and/or assessment practices they used.

> H_1: There will be a statistically significant relationship between pedagogical beliefs reported by interdisciplinary teachers and the teaching styles and/or assessment practices they use.
>
> H_0: There will be no statistically significant relationship between pedagogical beliefs, and
>
> > a. assessment practices of interdisciplinary team teachers, or
> >
> > b. teaching styles of interdisciplinary team teachers.

Pedagogical Beliefs and Teaching Styles/Assessment Practices

Section A of the instrument specifically addressed the issues of pedagogical beliefs of teaching styles and assessment practices. First, in Section A1 teachers responded to a series of eight statements, only one of which was clearly learner-centered. (A1g states that students should help establish criteria for assessing their work.) Teachers who disagreed or strongly disagreed to questions A1 a, b, c, d, e, and f indicated that they preferred a more learner-centered approach to education. The Adler & Flihan (1997) continuum identified student-developed criteria for assessment as reconstructed knowledge; therefore, it is highly learner-centered. Of the teachers responding, 66% indicated agreement or strong agreement with this statement.

To determine if there were a statistically significant difference between teacher responses to the philosophically learner-centered question and the more traditional beliefs, a Kruskal-Wallis One-Way ANOVA was used to test

relationships between sets of questions aligned along similar philosophical beliefs. Those tests showed no statistically significant difference in responses among questions A1 a, b, c, d, e, and f. Since these statements reflected more teacher-centered or traditional teaching philosophies, the expectation would have been that teachers with learner-centered beliefs would disagree with these statements. The frequency distribution indicated that interdisciplinary teachers in this study did disagree more often with statements reflecting teacher-centered philosophies.

Furthermore, question A1g, which stated that students should help establish criteria on which their work would be assessed, forced the opposite response from teachers if they had responded reliably. The Kruskal-Wallis analysis showed a statistically significant difference in response to statement A1g compared with statements A1 a-f. This series of statements indicated statistically significant relationships in two ways. First, there was no significant difference in responses between similar, learner-centered statements, but there was a statistically significant difference between responses to the learner-centered statement and the teacher-centered statements. With statistically significant relationships, the null hypothesis was rejected.

In Section A2, the distinction between learner-centered biased statements and teacher-centered or traditional biased statements was less obvious than in A1. In both sets of statements, however, teachers were more closely aligned with the learner-centered biased statements as indicated in Figure 4.7. Statements A2 a, d, e began with the learner-centered statement, while statements A2 b, c, f began with a teacher-centered statement. As in

A1, a series of Kruskal-Wallis analyses indicated no difference in similar learner-centered responses (A2 a, d, e), but there was a statistically significant difference among teacher-centered responses (A2 b, c, f). Teacher responses indicated some pedagogical ambivalence with questions about how much and what kind of knowledge students should learn. Finally, a one-way analysis of all six questions indicated a statistically significant difference. These were mixed results, because the learner-centered responses showed no statistical difference, but all other combinations did demonstrate statistical differences. With statistically significant relationships, the null hypothesis, that there was no statistically significant relationship between pedagogical beliefs and assessment practices and teaching styles of teachers surveyed,was rejected here as well.

In Section A3, there were mixed results on the issues of assessment. Teachers clearly favored some types of assessment (questions A3 b, c, d, g) over others (questions A3 a, f, h). Ninety-three percent of the teachers ranked open-ended problems as "very useful" or "essential" in judging how well students learned, while 85% ranked essays and oral presentations as "very useful" or "essential." A Kruskal-Wallis analysis indicated that teachers' responses in gauging the usefulness of essays, open-ended problems, individual projects, group projects and oral presentations showed no statistically significant difference.

A frequency distribution demonstrated that 53% of the teachers ranked objective test questions as "moderately useful," while 23% said they were only "slightly useful." Additionally, 74% of the teachers ranked standardized tests as "slightly useful" or "not useful" in judging how well students learned. A

Kruskal-Wallis analysis indicated that there was a statistically significant difference between how teachers valued questions A3 a and f, and how they valued questions A3 b, c, d, e, and g.

There was also a difference in how teachers valued portfolios, interviews/conferences, peer assessments, and self-assessments. A Kruskal-Wallis analysis demonstrates no statistically significant difference among portfolios, group projects, and individual projects, but there was a statistically significant difference between portfolios, essays, and open-ended problems. There was also a statistically significant difference between objective test questions, standardized tests and portfolios. As in A1 and A2, there were relationships among teacher responses to learner-centered questions and responses to teacher-centered questions regarding A3. With statistically significant relationships, the null hypothesis, that there was no statistically significant relationship between pedagogical beliefs and assessment practices of teachers surveyed, was rejected.

To gain an understanding of the relationship between pedagogical beliefs and teaching styles of interdisciplinary team teachers, section B7 queried the extent to which interdisciplinary teams used specific teaching styles. The frequency distribution indicated that teachers used a variety of teaching styles; however, 57% of the teachers ranked B7d (a style where both teachers taught small groups different subjects) as being used "very often" or "always." The teaching style in which both teachers taught the same subject to small groups (B7c), and the teaching style in which one teacher assumed the lead role while the partner worked as a helper (B7e) were used the least. A Kruskal-Wallis analysis showed a probability of .0001, suggesting that the

relationships between team teaching practices and pedagogical beliefs, even among interdisciplinary team teachers was statistically significant. With statistically significant relationships, the null hypothesis, that there would be no statistically significant relationship between pedagogical beliefs and teaching styles of teachers surveyed, was rejected.

In summary, Null Hypothesis 0a was rejected in terms of both the philosophical beliefs teachers have about teaching and assessment practices in general, and it was rejected upon closer examination of specific assessment practices. Null Hypothesis 0b was also rejected in light of an analysis of team teaching styles and assessment practices.

Interdisciplinary Organizational Structures and Assessment Practices

While the first question organized relationships between beliefs and practices of interdisciplinary teachers, the second question in this study attempted to examine how interdisciplinary organizational structures affected assessment practices.

H_2: There will be a statistically significant relationship between interdisciplinary experiences and assessment practices.

H_0: There will be no statistically significant relationship between interdisciplinary experiences and assessment practices.

Section C tested assessment practices as they applied to interdisciplinary teachers. Frequencies of C1 and C3 indicated that teachers changed assessment practices to at least a moderate extent and that they attributed those changes to interdisciplinary team teaching. A Kruskal-Wallis analysis compared results of other questions (B6, B7a, A1g, and A3c) with C3 to explore

relationships among them. Specifically, question B6 asked how much time teachers engaged in planning together; B7a asked how much dual-directed instruction teachers preferred; C3 asked to what extent interdisciplinary team teaching changed assessment practices; A1g asked to what extent teachers thought students should help establish assessment criteria; and A3c asked teachers to indicate how useful they viewed open-ended problems to be wherein more than one solution existed. Becker & Anderson (1998) and Adler & Flihan (1997) have identified the interdisciplinary experiences described through these survey questions as highly learner-centered activities. The P value of the Kruskal-Wallis analysis of these interdisciplinary experiences was .0001, which indicated a statistically significant relationship between them. If there were statistically significant relationships, the null must be rejected. The null hypothesis, that there was no statistically significant relationship between interdisciplinary experiences and assessment practices, was therefore rejected.

One way to control for internal validity is to control for extraneous variables which may have affected responses (Borg & Gall, 1996). Section C4 provided teachers an opportunity to attribute assessment practices to something other than interdisciplinary structural organization. As a Kruskal-Wallis analysis verified, there was a statistically significant relationship between interdisciplinary structures and assessment. In an analysis of other school situations such as subjects and grades taught, district policies, changes in climate of the school, or the ability of students, no statistically significant change in assessment practices surfaced. Likewise, when alternative block scheduling, team teaching in interdisciplinary situations, understanding

student learning, or changes in goals were compared, no significant differences in reported assessment practices emerged. Noticeable differences in assessment practices surfaced, however, when alternative/block scheduling, team teaching and understanding how students learn were compared to changes in school climate, subjects or grades, ability of students, or staff development.

Interdisciplinary teachers reported learner-centered beliefs and practices in both their teaching styles and in their assessment practices. While teachers' reported beliefs aligned strongly with Adler & Flihan (1997), reconstructed knowledge (stage three), teacher practices were more consistent with the shared knowledge (stage two) program designs.

Teachers were highly consistent in their responses to questions in this survey. There were no indications that the teaching philosophy reported by teachers significantly differed from the teaching or assessment practices teachers reported using. Teachers consistently attributed much of their changes in assessment practices to interdisciplinary team teaching experiences. Furthermore, teachers who made written comments were proud of the interdisciplinary work they were doing and expressed belief that they had been regenerated by their team teaching experiences.

CHAPTER FIVE

FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

> Commitment to exemplary practice means practicing at the edge of teaching, by staying abreast of new developments, researching one's practice, trying out new approaches. . . . it means accepting responsibility for one's own professional development (Sergiovanni, 1992, p. 53).

In his book Moral Leadership, Thomas Sergiovanni contends that the best teachers are those who demonstrate a commitment to the practice of exemplary teaching by continuing to expand their own learning as well as by taking responsibility for the planning, practice and development of new teaching practices known to be effective in the classroom. Interdisciplinary team teachers studied in this research clearly exemplify Sergiovanni's ideal. Teachers searching to find ways to make connections for students do not always fade away into retirement rigidly clinging to "traditional" teaching and assessment practices. If they believe, as Sergiovanni has suggested, that practicing at the edge of the profession means "staying abreast of new developments, researching one's practice, [and] trying out new approaches," they are also likely to be on their way to becoming interdisciplinary teachers.

Findings and Conclusions

Not only was the statistical analysis of this research bolstered by a strong response rate of 75%, but written comments from the sample offered further insights into the thinking of today's interdisciplinary teachers. These teachers enthusiastically described programs and classroom instruction

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techniques which reflected a well thought out commitment and dedication to educational practice. This was especially notable considering the high level of experience of the teachers participating in this research. The following conclusions and observations are based upon the statistical analyses, as well as the written commentary, provided by the teachers in the sample.

Sample Characteristics

- Veteran teachers have been instrumental in the development of notable interdisciplinary programs in Alaska, Washington, Idaho, Montana, Wyoming, and Oregon. Although greatly experienced, significant numbers of teachers have embraced interdisciplinary models of instruction only within the last five years.
- Experience rather than formal training appeared to precipitate the interdisciplinary, learner-centered classrooms in this study. Over half of the teachers surveyed were teachers with more than twenty years teaching experience. Of the fifty-four responses, only ten teachers reported five years or less teaching.
- Interdisciplinary teams appear to be isolated from other teams and relatively few in number. Many school districts and state educational organizations were unaware of high school interdisciplinary team activity in their state, or had limited knowledge about interdisciplinary structure. Where teams did exist, however, administrators and other teachers reported their situations with enthusiasm and with respect for the work these teachers had been doing.

Philosophy and Practice

- Experienced educators who have become interdisciplinary teachers viewed their role in the classroom as having changed. Teachers reported having become more of a facilitator than a traditional teacher. Teachers also reported a strong commitment to educating and evaluating the progress of the "whole" child. Not only did they value teaching relevant core knowledge, but they also believed that social behavior, communication, group collaboration, problem solving, and self-reflection should be taught and assessed as part of the regular classroom experience.

- Teachers reported highly learner-centered philosophies but continued to be concerned about the amount and quality of subject content students needed. Many teachers acknowledged the value of students having a certain level of understanding and knowledge as a foundation. Although it was not always clear how teachers delivered that knowledge base to students, teachers with more years of interdisciplinary team teaching experience seem to have resolved these issues and endorsed project-based, research-oriented learning models.

- Teachers reported changing the goals they had for students, but they did not directly indicate that those changes were predicated upon a change from traditional to learner-centered philosophy. Conversely, many teachers indicated that the learner-centered beliefs precipitated their interest in the interdisciplinary structure.

- Teachers reported that they taught and assessed differently in interdisciplinary classes than they had done in previous classrooms.

Although some teachers indicated that they used learner-centered techniques in regular classrooms, most teachers credited the interdisciplinary experience as having altered their practices and philosophy. Furthermore, any written examples offered in the cases of teaching and assessment practices were highly learner-centered in nature.

- While teachers reported that they were philosophically aligned with the Reconstructed Knowledge (stage three) of the Adler & Flihan (1997) continuum characterized by the elimination of disciplinary boundaries, the practices they reported utilizing most often were aligned with the Shared Knowledge (stage two), characterized as having overlapping concepts, mutually supported disciplines, and preserved boundaries. However, the most enthusiastic commentary came from teachers who viewed their practices as predominately characterized in stage three, thereby representing synthesized, blended, problem-centered and integrative approaches to learning.

Influences of School Climate and Culture on Interdisciplinary Classrooms

- Teachers who apparently had more autonomy in decision making about partners, class organization, and curriculum structure reported more successful and satisfactory interdisciplinary experiences.
- Teachers reported a wide variety of subject combinations with consistent positive attitudes about interdisciplinary teaching styles and assessment practices. It appeared that many variations of subjects in combination classes were successful. Teachers in combinations such as

math/science or art/history reported success as enthusiastically and consistently as did combinations including an English teacher.

- Teachers consistently complained of not having enough time to plan together. They reported, however, that developing a trusting relationship with their partner(s) helped mitigate the problem of inadequate planning time.

- Whenever school climate and culture facilitated more blended classroom structures and discipline practices, teachers perceived better learner-centered classroom experiences. When teachers discussed their perceived weakness in interdisciplinary practices, the weaknesses were often attributed to issues beyond the individual classroom control. For example, teachers believed that scheduling complexities of the larger system created obstacles to perfecting their interdisciplinary classes.

- Interdisciplinary teaching/assessment practices appeared to be teacher generated and maintained. Teachers did not attribute district policies or expectations, or climate as significant factors in their decision to become interdisciplinary teachers. Instead, searching for solutions, asking questions about about how to impact students, and seeking opportunities to try something different seemed to impact the choices made by teachers in this study.

- Interdisciplinary teachers clearly recognized and acknowledged the value of interactive dual teaching when students participate in the construction of knowledge and contribute to assessment decisions along with the teachers; however, teachers did not participate in this style of team teaching in consistent numbers. Often, outside influences

such as scheduling issues, preparation time, or organizational structures dictated the form of team teaching used. These teachers did not at all indicate that a lack of training or interest prevented their use of dual-directed teaching.

- The findings on alternative/block scheduling were mixed. Several interdisciplinary teachers indicated that they did not view block scheduling as facilitative of interdisciplinary work because it placed even more restraints on scheduling. Others suggested that blocks of two hours in a regular schedule forced class size to double, in turn defeating the purpose of the learner-centered classroom. Still, this study showed that 56% of the teachers believed block or alternative scheduling to be an important factor in altering their teaching and assessment practices toward a learner-centered paradigm.

Assessment Practices in Interdisciplinary Classrooms

- Interdisciplinary team teachers report extensive use of learner-centered assessment practices. Although they acknowledged value in the use of quick checks to measure student learning on basic concepts, they strongly endorsed open-ended problems, student projects, as well as both peer and self-assessments.
- Teachers indicated that their expanded understanding of how students learn was inspirational in the development of more learner-centered approaches to assessment. Teachers reported that they had learned to value student participation in assessment much more as a result of their interdisciplinary experiences.

• Portfolio use as an assessment tool received mixed reviews. Teachers with less team teaching experience expressed an interest in trying portfolio assessments at some future date. Here, influences such as district policies sometimes influenced teachers' decisions about assessment, but this research neither explored specific types of portfolio use nor sought information regarding teachers' interpretations of state or national influences.

• Most teachers reported changes in assessment practices after they had begun team teaching in interdisciplinary situations. Furthermore, they attributed those changes to interdisciplinary teaching. Many teachers reported that the interdisciplinary activities provided more opportunities for them to utilize such practices as project-based and open-ended assessment. History teachers indicated that they had used essay assessments more as a result of their interdisciplinary experiences. Many teachers indicated increased use of and a greater appreciation for formative assessments in the interdisciplinary situations.

• Interdisciplinary teachers collaborated to some extent on the assessment of student work, using benchmarking rubrics and sharing of the workload, but it was unclear here just exactly how teachers defined such collaboration. There was little indication, for example, regarding how the collaboration affected student grades or even how teachers reported the grades. Although there was some indication that teachers used collaborative assessment methods with students in developing final assessments or determining final grades, the teachers' written

commentary was not useful in providing further details. This lack of clear response to collaboration methods with students indicates that most teachers were probably practicing at the Shared Knowledge stage (stage two), rather than the Reconstructed Knowledge stage (stage three), on the Adler & Flihan (1997) continuum.

Recommendations

Recommendations for further research to expand and complement the findings in this study will comprise the first part of this section. The second part will offer recommendations for changes in high school improvement plans, practices and policies. The final analysis will briefly discuss current and future interdisciplinary progress.

Recommendations for Further Study

Although this research was dominantly quantitative, teachers also had the option of responding to the instrument with written commentary in many of the survey sections. It was clear from the number of written responses included, that teachers held strong views and felt compelled to provide more specific details than many of the questions on this instrument sought. As a result, the following recommendations include the additional caveat that mixed methodological designs or qualitative-dominant designs be employed in further research.

- •Research should be conducted to examine the differences between the assessment and teaching practices of single-teacher/discipline structures organized around traditional schedules, and

interdisciplinary teams organized in block/alternative schedules. This type of investigation could be invaluable in focusing school restructuring and school improvement plans.

• Further research studying team teaching relationships could provide significant information regarding effective methods of formulating teams. These partnerships often require time to develop trusting relationships among the members. Studying teams with current partners spanning three or more years should therefore be the focus of any such further investigation. More research on the factors contributing to a successful team is also necessary to understand more fully how these teacher teams make decisions about instruction and assessment.

• Research which studies classroom management in interdisciplinary team structures could provide insight into how the rules of student behavior change in a more learner-centered classroom. More information about who makes the classroom rules and who enforces them in interdisciplinary classrooms would offer insight into the degree to which learner-centered philosophy actually exists in practice in an interdisciplinary classroom.

• More research regarding assessment practices in interdisciplinary classes could determine the level of usage of portfolios, rubrics, tests, self-assessments, and peer assessments. Research focusing on the types and usage of formative assessment could be important for national school and standards reform efforts.

•Research analyzing the use and management of student cooperative or
collaborative groups in interdisciplinary classrooms would provide
information to augment current learning in areas such as emotional
intelligence, brain based research, multicultural classrooms, school-to-
work experiences, and gender differences in learning.

•Research exploring teachers' use and understanding of standardized
tests would better focus the debate regarding traditional assessment
practices versus more learner-centered assessment practices. Further
research in standardized assessments could help teachers reconcile
their dichotomous needs to assess students individually, yet report
assessment results to the public as part of the larger picture. A clearer
understanding of the ways teachers evaluate student success in social
skills, communication, groups work, critical thinking, and self-
reflection may provide valuable insight into more creative
construction and use of future standardized tests.

•Further research on block and alternative scheduling could explore
the impacts of those schedules on student learning. Research is
necessary, as well, to determine block schedule impacts on
interdisciplinary classrooms.

Recommendations for Changes in Policy and Practice

Teachers in this study consistently attributed the difficulties that they
experienced in attaining their desired level of interdisciplinary blending to
outside influences. They told of situations in which classroom size,
scheduling practices, and teacher assignments inhibited their efforts. They

further expressed a desire to be able to network with other interdisciplinary teachers regarding issues inherent in interdisciplinary classrooms. To better facilitate interdisciplinary work, the following recommendations suggest that those who make decisions regarding policy and practice become more proactive in their decisions affecting interdisciplinary classrooms.

- District, state, and national policy makers must become cognizant of the learning currently taking place in interdisciplinary classrooms. As educators seek to provide significant and relevant educational experiences for a diverse and multicultural population, teachers find themselves caught in the cross-hairs of the uncertain Twenty-First Century and the often entrenched pedagogy popularized in the Nineteenth Century. There is much debate about whether students learn best through traditional teacher-centered teaching and assessment, or whether they learn best through more learner-centered teaching and assessment. Myers (1996) has suggested that new "standards of literacy" could improve not only our educational practices, but our workplace, our civic forums and our personal reflections. Teachers with twenty years or more in the field seem to have established significant learner-centered practices within interdisciplinary classrooms which correspond closely to what Myers has defined as the "event-based" features of translation/critical literacy.
- Policy changes must translate into changed teacher practices. In an attempt to respond to the national call for content standards and performance based assessments, states like Minnesota have forged an all-out effort to create standards applicable to all students (Pitton, 1999).

However, as Nelson (1999) observed:

> In each classroom in this country there is a highly educated
> adult with the potential for creating meaningful learning
> environments that address the needs of every student. Those
> adults should be supported and empowered so that they can be
> the "Origins" of practices that meet the needs of very singular
> classroom communities (p. 392).

Interdisciplinary teachers have done significant work in an attempt to
improve learning for their students. Teachers in learner-centered
classrooms have recognized that student learning is multifaceted and
must be assessed as such. Content standards and performance based
assessments must address these same issues so that teachers can
respond appropriately.

• District policy must consider the value and importance of formative
assessment. As Black & Wiliam (1998) describe in their literature
review, attempts at raising standards should include the use of
formative assessment. In interdisciplinary classrooms, formative
evaluation appears to be a major feature achieved slowly by building
upon existing good practice (p. 140). Teachers who use peer and self-
assessments, portfolios, interviews, group projects and essays to
evaluate student work consider more than a singular score on a test to
determine student learning. Careful consideration of the work being
conducted by such organizations as the National Study of School
Evaluation (NSSE) and the Center on Learning, Assessment, and
School Structure (CLASS) may provide a basis for developing valid and

reliable formative assessment practices.

• Interdisciplinary classes should become an essential element in high schools as part of the cultural fabric of student experience. Many teachers in this study reported that indifferent or hostile district policies inhibited their effectiveness in interdisciplinary settings. Hiring practices and six-period traditional scheduling approaches mitigated the effectiveness of interdisciplinary classrooms. In addition, teachers often reported insufficient planning time as a major problem. It would appear that only highly dedicated and innovative teachers are capable of practicing interdisciplinary instruction in the face of these organizational barriers.

• National and regional professional organizations (eg., the National Council of Teachers of English, the National History Education Network, and the National Science Teachers Association) should officially recognize the work of interdisciplinary teams, actively solicit professional development for interdisciplinary teachers, promote curriculum development applicable to interdisciplinary instruction, and initiate the establishment of national networks for interdisciplinary teaching. Essentially, at the present time interdisciplinary teachers lack support from national or regional organizations, and also lack accessible means to communicate with other educators who may be pursuing similar instructional or assessment issues. This absence of a network has posed a great barrier against completing research on interdisciplinary teams to verify the location and the identification of interdisciplinary teams.

•Colleges and universities should bolster their educational programs to enhance the development, implementation and assessment of interdisciplinary classrooms. Course work should be augmented by pre-service teacher education training which places teaching teams with master teachers engaged in team teaching.

Final Analysis

Research has demonstrated that the learning process is far more complicated than is measurable via a standardized test. Further, students have lost interest in a curriculum that seems to have little or no relevance to their lives, while communities have lost confidence in local efforts to educate their youth with rote learning. Finally, teachers have continued to struggle with the dilemmas surrounding standards and assessment as they search for solutions.

The traditional view of education stresses concrete and measurable accomplishments and seems fearful of more abstract, reflective approaches that learner-centered classrooms tend to exhibit. A teacher from Wyoming who chose not to complete the instrument in this survey wrote:

Traditional classes are anachronistic, although our culture seems hell-bent on ignoring that fact. When one approaches our educational dilemma from the perspective that an educational environment must keep pace with the world outside the ivory tower, assessment practices follow suit.

Perhaps adherence to the learner-centered approach is one of the largest and most significant changes proponents of the interdisciplinary classrooms

address. Teachers in these classrooms have consistently reported that they valued assessment which measured accomplishments in the attainment of knowledge, but that students' accomplishments must include social and/or behavioral abilities, communication competence in large and small group situations, and performance skills. More traditional assessments ignore learning in these realms despite their essential nature throughout students' lives.

Methods of evaluation such as portfolios, oral presentations, peer and self-assessments, and other learner-centered techniques are capable of creating a forum in which students and teachers together may thoughtfully and systematically measure student growth and competence. These assessments provide a medium for students to consider seriously the value of their work. They are more likely to become critical thinkers who learn to identify problems, seek resources to resolve them, and reflect upon their own growth. Teacher teams in interdisciplinary classrooms have become facilitators of learning rather than sage oracles whose own content limitations sometimes inhibit student advancement. Educators and students who use learner-centered assessments have discovered that objective and standardized tests seem insignificant and even redundant to the more meaningful process at hand.

In the final analysis, interdisciplinary instruction employs the best of both old and new practices. Teachers believe that knowledge is transmitted to students in a variety of ways depending upon the individual learner. Teachers who make the commitment to teach interdisciplinary instruction often leave behind many of their old regimented practices in classroom

management and assessment. They embrace the content and approaches appropriate for a variety of disciplines, and invent many new techniques as they go along. Often these new techniques include new way to teach and assess the traditional knowledge requirements. These educators are truly the pioneers of futuristic education.

It is not enough that we offer interdisciplinary courses, without changing the philosophical approach to education. If we are not learner-centered and practice the art of teaching one student at a time, we have not accomplished a thing. Time and experience continues to outstrip our adult experts. It is not enough that we teach children what to learn. We must also teach students how to learn.

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APPENDICES

Appendix A

Characteristics of teaching practice and pedagogy compatible with

Constructivist Learning Theory (Page 1 of 3)

Instructional Tasks

Real world: Tasks connect students to real people and situations.

Depth: Limited number of interrelated topics, studied in great detail.

Projects: Student work is related to long projects involving several tasks.

Basics Embedded: Skills and facts are learned as part of an integrative activity.

Self-direction: Students plan and carry out work without detailed directions.

Student interest: Topics and tasks assigned consider student interests.

Student choice: Students have some authority to decide topics and tasks.

Student ideas: Student ideas are elicited.

Motivation: Teachers believe they have the responsibility to motivate. Teachers get students emotionally invested in the topic.

Task-focused: Students focus on accomplishing learning rather than on a reward or benefit received from completing the task.

Concrete: Teachers use concrete examples, personalized to student experience in order to make concepts more understandable.

Multiple ideas: Lessons include multiple representations of same ideas.

Explicit rationales: Teachers explain rationale for procedures.

Social rationale: Teachers show historical, cultural and social importance of content.

Appendix A -- Characteristics (Page 2 of 3)

Understanding: Teachers draw attention to prior student understanding.

Learning process: Teachers consider the learning process of how students learn rather than just how to present the material.

Cognitively Demanding Tasks

Challenge: Challenging rather than easy tasks are important.

Critical thinking: Tasks focus on reasoning, explanation, evidence, argument.

Ambiguity: Ambiguous problems and issues with no correct answers are important and valuable to the learning process.

Synthesis: Students explore connections between concepts or information sources.

Inference: Students develop abstractions, rules, generalizations form specific data.

Hypothesizing: Students make their own hypotheses and explore them.

Writing to think: Students write to engender thinking.

Revision: Students edit and revise work previously done.

Oral explanations: Students explain and reason orally.

Assessment: Complex assessment rather than multiple-choice.

Meta-cognition: Students self and peer assess.

Resources: Lessons employ many resources beyond the textbook and worksheets.

Problem-solving: Students analyze and strategize how to complete assignments.

Appendix A -- Characteristics (Page 3 of 3)

Social Learning

Active learning: Students work out of their seats and interact with others.

Peer interactivity: Students work collaboratively.

Peer discourse: Students work in groups to foster intellectual discourse, ask questions and reason together.

Leadership: Students take leadership roles with peers and others.

Teacher resource: Teachers facilitate independent student work.

Modeling: Teachers model what it is like to learn, verbalizes own reasoning and asks questions they cannot answer themselves.

Note. The data from Appendix A is from "Validating Self-Report Measures of the 'Constructivism' of Teachers' Beliefs and Practices, v 1.01, by Henry Jay Becker and Ronald E. Anderson, April, 1998. Adapted with permission.

Appendix B -- Survey Instrument

Your Teaching Philosophy

A.1 Indicate how much you disagree or agree with each of the following statements about teaching and learning.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a. Teachers know more than students; they shouldn't let students "muddle" around when they can just explain the answers directly....................	☐	☐	☐	☐	☐
b. A quiet classroom is generally needed for effective learning	☐	☐	☐	☐	☐
c. Instruction should be built around problems with clear, correct answers...	☐	☐	☐	☐	☐
d. Instruction should be built around ideas that most students can grasp quickly	☐	☐	☐	☐	☐
e. How much students learn depends on how much background knowledge they have; that is why teaching facts is so necessary...........................	☐	☐	☐	☐	☐
f. Student projects often result in students learning inaccurate or incomplete knowledge.........................	☐	☐	☐	☐	☐
g. Students should help establish criteria on which their work will be assessed...	☐	☐	☐	☐	☐

A2. Different teachers have described very different teaching philosophies to researchers. For each of the following pairs of statements, check the box that best shows how closely your own beliefs are to each of the statements in a given pair. The closer your beliefs to a particular statement, the closer you check. Please check only one for each set.

a. "I mainly see my role as a facilitator. I try to provide opportunities and resources for my students to discover concepts for themselves."

☐ ☐ ☐ ☐ ☐

"Students really won't learn the subject unless you go over the material in a structured way. It's my job to explain, to show students how to do the work and to assign specific practice."

b. "The most important part of instruction is the content of the curriculum. That content is the community's judgment about what students need to be able to know and do."

☐ ☐ ☐ ☐ ☐

"The most important part of instruction is that it encourage "sense-making" or thinking among students. Content is secondary."

c. "It is useful for students to become familiar with many different ideas and skills even if their understanding, for now, is limited. Later, in college perhaps, they will learn these thing in more detail."

☐ ☐ ☐ ☐ ☐

"It is better for students to master a few complex ideas and skills well, and to learn what deep understanding is all about, even if the breadth of their knowledge is limited until they are older."

d. "It is critical for students to become interested in doing academic work— interest and effort are more important than the particular subject-matter they are working on."

☐ ☐ ☐ ☐ ☐

"While student motivation is certainly useful, it should not drive what students study. It is more important that students learn history, science, math and language skills in their textbooks."

e. "On our team both of us give direct instruction to the whole group interactively."

☐ ☐ ☐ ☐ ☐

"On our team we take turns being lead teacher so the other person can get some grading done."

f. "On our team, we divide curriculum responsibilities and each teacher plans for his/her own students."

☐ ☐ ☐ ☐ ☐

"On our team we collaborate and make instructional decisions together."

A3. How useful are each of the following kinds of assessments for you in judging how well students are learning?

	Not Useful	Slightly Useful	Moderately Useful	Very Useful	Essential
a. Objective test questions, such as true/false, multiple choice, matching fill in the blank...................	☐	☐	☐	☐	☐
b. Essays	☐	☐	☐	☐	☐
c. Open-ended problems such as problems which have more than one solution and/or more than one correct answer...........	☐	☐	☐	☐	☐
d. Individual projects.....................	☐	☐	☐	☐	☐
e. Group projects..........................	☐	☐	☐	☐	☐
f. Standardized test results................	☐	☐	☐	☐	☐
g. Student oral presentations/performances..	☐	☐	☐	☐	☐
h. Portfolios (collection of student work, assembled to represent student achievement).	☐	☐	☐	☐	☐
i. Interviews/conferences..................	☐	☐	☐	☐	☐
j. Peer assessments........................	☐	☐	☐	☐	☐
k. Self-assessment.........................	☐	☐	☐	☐	☐
l. Other..................................	☐	☐	☐	☐	☐

If other, please explain:_____

YOUR TEACHING EXPERIENCES/PRACTICES

B1. How many years have you been a full-time teacher? _____

B2. List grade level(s) you team teach: _____

B3. How many years have you been a team teacher? _____

B4. How many years have you teamed with current partner (s)?_____

B5. What subject(s) do you currently team teach? _____

B6. How many hours each week do you work with a partner on lesson planning? _____

B7. Please indicate to what extent your team uses each of the following teaching styles.

	Never	Some-Times	Often	Very often	Always
a. Dual-directed teaching—both partners are giving direct instruction to the whole group interactively	☐	☐	☐	☐	☐
b. Alternating as lead teacher— giving direct instruction, partner acting as helper, reinforcer, etc.	☐	☐	☐	☐	☐
c. Both are teaching small groups same subjects..	☐	☐	☐	☐	☐
d. Both are teaching small groups different subjects................................	☐	☐	☐	☐	☐
e. One teacher generally assumes lead role, partner as helper......................	☐	☐	☐	☐	☐

Please include any comments or clarification here:_____

YOUR ASSESSMENT PRACTICES

	None	Slightly	Moderately	Very much	Completely
C1. Regardless of assignment, to what extent have you changed assessment practices over the last 3 years?	☐	☐	☐	☐	☐
C2. To what extent do you collaborate with a partner on assessment of student work?	☐	☐	☐	☐	☐
C3. To what extent has interdisciplinary team teaching changed your assessment practices?	☐	☐	☐	☐	☐

Please explain:_____

_____

_____

C4. If you have altered in any notable ways your assessment practices over the duration of your teaming experience, how important were each of the following in those assessment decisions?

	No Change	Not a reason	Minor reason	Moderate reason	Major reason
a. Changes in the subjects or grade levels you teach.	☐	☐	☐	☐	☐
b. Changes in district policies and expectations...	☐	☐	☐	☐	☐
c. Changes in the climate or emphasis at your school...	☐	☐	☐	☐	☐
d. Changes in the abilities or prior achievement of the students you teach....	☐	☐	☐	☐	☐
e. Staff development and workshop experiences you have had...............	☐	☐	☐	☐	☐
f. Discussions with colleagues at school....	☐	☐	☐	☐	☐
g. Changes in main goals you have for students.	☐	☐	☐	☐	☐
h. Changes in your understanding of how people learner understand things.........	☐	☐	☐	☐	☐
i. Opportunities to team teach in an interdisciplinary classroom	☐	☐	☐	☐	☐
j. Alternative or block scheduling...........	☐	☐	☐	☐	☐
k. Other.................................	☐	☐	☐	☐	☐

If other, please explain:_____

_____

_____

Thank you very much for your time and effort in completing this survey. Please feel free to contact me if you would like a copy of the summary of the results from this study or if you have any questions.

Fax (406) 791-2347
wortmanchris@mcn.net

Please return this survey as soon as possible in the postage-paid envelope provided, or mail to:
Christine Wortman
1705 Alder Dr. # 19
Great Falls, MT 59401

Appendix C– Request for use of Becker Study

Dear Sir:

I am beginning a study for a doctoral dissertation under the direction of Dr. Roberta Evans at The University of Montana, Missoula, Montana.

The dissertation will study the relationship between assessment practices teachers use and their level of involvement in interdisciplinary classrooms using the constructivist model of cognition as the theoretical basis of study. The study will explore the relationship between the amount of time teachers have been teaching in interdisciplinary classes and the assessment practices used in the classroom; the relationship between the type of interdisciplinary class teachers identify and the assessment practices; and the relationship between satisfaction with the interdisciplinary practices and assessment practices.

I am requesting your permission to use some of the questions you have asked in your survey "Teaching, Learning, and Computing: 1998, A National Survey of Schools and Technology." I have just finished taking your survey and was delighted with the quality of the questions. I would very much like to use those questions which would apply to my study from part A and part B of your survey, Version 2. I would also like to use the format of part D: "Changes in your Teaching" if I could gain your permission.

Can you suggest any related studies or current work being done which would help me explore the relationship between assessment practices and teacher involvement in interdisciplinary classes? Any information will be greatly appreciated, and I will be happy to share the results of my research with you if requested.

Sincerely,

Appendix D -Becker Permission Granted

From: Hank Becker on Friday, March 27, 1998

Subject: Re: dissertation Survey question request

Chris,

Sure, I am delighted that you find the questions worthwhile for your

dissertation work. Please keep me informed of your progress.

In return, any encouragement you can give to other teachers at your school

who have been asked to complete a survey would be greatly appreciated. If

you are not the survey liaison for your school, your principal should know

who were asked to complete the survey booklets.

Sincerely,

Hank Becker

Appendix E – Letter to NCTE Presidents

April 15, 1998

Dear Colleague:

I am an NCTE member and an English teacher at C. M. Russell High School in Great Falls, Montana. I am doing a study for my doctoral dissertation to investigate assessment practices of interdisciplinary teaching teams in high schools. Dr. Beverly Ann Chin has suggested that I seek the assistance of NCTE presidents such as yourself in the nomination of English teachers who might be willing to participate in this study.

Specifically, I am looking for high school teams who have integrated the English curriculum with another subject such as history, science, math, art, or any other regular education curriculum. The teams I seek must collaboratively plan, teach and assess together, preferably in a block schedule.

Would you please nominate 5-10 high school teaching teams in your state or direct me to a contact person who could provide me with this information? Include any data such as names of schools, telephone numbers, e-mail addresses, etc. which will help me locate and contact these people. I would greatly appreciate a response as soon as possible, but I do need the information by May 15, when I will present my proposal to my committee.

Findings from this study will help us better understand and organize teaching experiences. Continual educational conversations about best teaching and assessment practices will benefit all of us in our chosen profession. Thank you for your help.

Sincerely,

Christine Wortman

Appendix F -- Cover Letter

Dear Colleague:

You have been selected to participate in a survey which seeks opinions of teachers in interdisciplinary classrooms from all areas of the Northwest. You are asked to share your experience and opinions about good teaching, how professional teachers assess their students, and what impact if any the interdisciplinary experience has on teaching and assessment practices.

It is my profound belief that teachers in collaborative teaching experiences have a wealth of information, and I hope you will take the time to share your thoughts with me.

In return, please feel free to contact me with comments, questions and ideas. I will gladly respond, and I will report the results of my research to anyone who is interested.

My e-mail address is <wortmanchris@mcn.net>.

As a teacher myself, I know how busy you are, especially at this time of year, but I trust that you will appreciate the importance of your special contribution to this study. Will you please take 15 minutes to complete the survey, place it in the self addressed envelope, and drop it in the mail today? All information that you provide will be kept strictly confidential. No school or person will be identified in my research.

Thank you so much for your help. Your professional experiences and judgments are important to this research and may provide some valuable information to policy makers who are interested in how we conduct the business of education.

Sincerely,

Christine Wortman

Appendix G
Teachers' Written Responses on Surveys (Page 1 of 8)

Responses to Question A1

- "Sometimes it pays to compromise-some teacher criteria, some student criteria."
- "Some background needed."

- "If 'muddle' means to confuse through purposely diverting the discussion to 'kill time,' then the teacher has the obligation to refocus the discussion. If 'muddling' occurs through student inquiry and input which is well-meaning and on topic, but nevertheless confuses, then that discussion should be allowed as a means to clarify. Obviously student involvement is critical and the teacher as lecturer should be long gone."

- "Ultimately the goal is that they grasp the key concepts, but that may not be accomplished quickly or easily."

- "Using an inquiry based model with a great deal of independent research, I have come to the conclusion that background knowledge is important to developing the questions for more independent research. The front-loading is more important than I once believed, but it should not be the major time absorber."

- "Yes, but benefits outweigh limitations. Student projects often result in inaccurate information due to the novice nature of students; research discrimination skills. Those are teachable moments. The incomplete nature of their knowledge is also to be expected and true of all knowledge bases. I strongly support and use student projects/research in spite of these limitations."

- Substituted the word "sometimes" in place of "generally".

- Disagreed strongly-then-changed the question to, "should be built around both ideas that most students can grasp quickly and ideas that challenge."

- "These, of course, are situation-dependent. There's no blanket rule in the education of a huge variety of people."

- Disagreed-then added, "in most cases."

- Did not mark a response but wrote, "often, but not always."

Appendix G
Teachers' Written Responses on Surveys (Page 2 of 8)

Question A2

- "We are actually sacrificing a prep period to teach collaboratively-had little support from our administration, therefore, we do need to take some time occasionally."

- Selected 1 then wrote, "Inspired minds can bring stronger and clearer power to its focus."

- Selected 5 then wrote, "Which may include any variety of student-teacher combination."

- "We don't co-teach."

- "We teach parallel courses, taking turns with different classes."

- Selected 2 on A2f then wrote, "At times-part of our flexibility."

Question A3

- Checked essential under A3l which provides for "other" responses, then wrote, "Written research assignments, take home essays, recognition of faulty reasoning and bias, utilizing primary and secondary sources."

- Indicated very useful to essential and then wrote, "not exclusively." Also wrote, "Feedback from outside the classroom/community response. (e.g. for public poetry readings) guest presenters' responses to interaction with students."

- After marking very useful on A3l in response to "other," wrote, "Short answer detailing information and the chance to 'add to' requested info for extra credit."

- A math teacher wrote, "Answers will vary according to subject matter."

- "We are six weeks into a new problem-based school, and we are still adapting ourselves to assessment."

Appendix G
Teachers' Written Responses on Surveys (Page 3 of 8)

• A person from Wyoming who did not complete the survey wrote, "Traditional classes are anachronistic, although our culture seems hell-bent on ignoring that fact. When one approaches our educational dilemma, from the perspective that an educational environment must keep pace with the world outside the ivory tower-assessment practices follow suit."

Question B6

• "Now...one hour, originally three-four."

• "None...no time."

• Teacher who teams on two different teams claims five hours each.

• "...less than one, we don't have a common prep and we don't live in the same town. Our teaching is based on trust."

• "-not enough. We do unplanned intensives. We are very good together-that's a plus-planning time-dependable and regular could be an amazing experience."

• "No specific partner planning time... too brief... might discuss ideas in hallway on the run! A few minutes here and there when we can get it."

• "10 on our own time!" (partners)

• Not used for statistical analysis, "...the team plans together. Four people-at least ten hours, not to speak of instructor interaction between 8 and 3 when students are present."

• Responded to the question by saying, ". . .one-we teach parallel not cooperatively."

Question B7

• Marked "Always" and then wrote, "Since two separate subjects are taught, this does happen-but for the most part we balanced each other."

• "We would 'integrate' more often if class size was smaller. We have a block of 50 students in one classroom-too crowed-we have split in two. We combine for activities and culminating research projects."

- "We have twice as many students (46) and divide them into two groups. I will see one group three days one week and two the next. However, at times both groups are together for lectures, speakers, special projects, etc."

- "When we work with individuals or lab groups, I would be focusing on logic, background review of literature, analysis as would my partner, but she has the biology knowledge of methods which I don't have, etc."

- "Introductions of statistical methods of data analysis might be my partner. I might focus on the style of writing-process of the abstract...."

- "Ours is a fully integrated program."

- "A trend I've noticed in my school is that because there are two teachers, staffing says the class should be 60 students. In my view this negates the benefits of integration. The span of control is just too large and teachers give up on integration and fall back into the same curriculum driven isolations."

- "My team partnership worked well the first year. The second year was a disaster. Our styles of teaching and communication skills were very different."

- "Our hope is that the longer we team teach together, the more we will be able to both give direct instruction to the whole group interactively."

- "Because of physical limitations we have difficulty getting the whole class together-frequently, we each teach half the group, but we are careful to be sure the content relates."

- "One year we were teaching one class together in the same room. Facilities do not permit that currently, so we are coordinating our math/chem classes. We did things much differently when we were in the same room together. I answered these questions according to our current teaching situation."

- "How our classes are divided depends on the particular unit. Some are more conducive to teaming than others."

Appendix G
Teachers' Written Responses on Surveys (Page 5 of 8)

• "We are usually leading interactively even when we have planned that one of us will lead a particular activity. We like having our students become interactive leaders. ___ is a chair director, musically trained and talented-yet sometimes I (who can't sing) am leading a Japanese song, or African chant and he tells his favorite story and I tell mine. . . ."

• "Both teachers work with students after instruction facilitating exploration and development of project. Two specialities provide excellent support-for example, art and English paired with social studies or history."

• "Team teach major projects only. . . .teach math individually-not teamed."

• An Alaska teacher responded to this set of questions with a comment only. "Our program is multi-grade, multidisciplinary project-based teaching, so we have project cycles wherein students, working in groups, work together to answer the essential question."

• Four teachers working together responded, "We teach each other first, then divide students into four tutor groups."

• A Wyoming teacher responded to this question with a comment only. "We have a problem-based program. Each tutor works with small groups on an interdisciplinary, messy, real problem. Our role is one of problem-based tutor, not that of a 'teacher.'"

• An Oregon teacher responded, "We view ourselves less as 'team teachers' than as collaborative partners teaching two subject areas that share points of natural and instructional integration."

• A teacher from Idaho who marked never on B7 a, c, d and sometimes on B7b and e (Alternating as lead teacher and on teacher assuming lead role) wrote, "This is how I have team taught for the past two months. I did not chose my partner; I was paired with him."

• Telephone response to survey-Said they did not have a big room to really team teach so they mostly parallel teach, which is why they never dual-direct or take turns as lead teachers and helpers. Indicated that a four period day was not "team teacher friendly." It impedes the work of true team teachers because of scheduling issues.

Appendix G
Teachers' Written Responses on Surveys (Page 6 of 8)

<u>Questions C1,2,3</u>

• "I look at another point given as to their decision on assessment. I see how it coordinates with mine and make a compromise. I also learn that my first impressions can be altered by another view point."

• "Regarding assessment-as a teacher I see a straight textbook approach with objective testing simply show what little the students know-or what we cover. Essays and research paper assessments (which I have switched to these last 5 years) show how much the students understand and what we 'uncovered.' The reason for objective tests is because they are easy to correct-easy to reproduce from textbooks (boo-hiss-lazy teacher). My two-block total equals 92 student essay exams."

• A Montana teacher who marked none on C3 said "I was project oriented many years ago, but it has been reinforced."

• "My significant shift came nine years ago in working with Rick Stiggins. . . . We may discuss the focus of each of our comments on a student's lab/field research or report, but often stray into each other's territory."

• "I'd never used a student produced video as a final exam, for example, or used student collaborated work for exams."

• "Overlapping of grading in content areas was a change. It was nice to have the history teacher do the editing, for example. Students saw that it wasn't just a skill for English."

• "As a history teacher, I found myself using essays and speeches as assessment tools.

• "More group work, peer assessment and collaborative assessment."

• "When grading projects, we have developed a grading scheme. We each grade each project separately and then we collaborate."

• "My changes of assessment are based more on personal growth and development rather than team teaching."

Appendix G
Teachers' Written Responses on Surveys (Page 7 of 8)

- "A lot of what is wonderful is hard to get into the grade book. Possibly more performance grades-more thorough student/self evaluations. I strongly feel any critique/evaluation/quiz needs to be a learning tool-one that engages and hopefully invites the mind."

- "We always try to provide a variety of evaluations. We continuously mix it up and keep refining. Quizzes we sometimes do separately-though we swap material and incorporate whatever we wish form each other's perspective."

- "I can learn more about an individual student, especially the special education kids who I have in my room. Assessment covers a more broad and integrated spectrum because of two specialities."

- "Assess major projects based on team rubric-math is taught with textbook materials."

- "We do more standards based authentic assessment."

- Incomplete survey-"I began teaching in a multi-disciplinary, team teaching environment. I can't imagine teaching in solitude."

- "Totally different."

- "I look more for holistic responses than I used to."

- "Assessment is not just a measure of learning; it has become a way to plan interventions, enrichment, future growth. It is a benchmark and a planned opportunity for self reflection."

- I've not moved into portfolio use, interviews, peer-editing to any great extent (yet)."

- "My assessment practices constantly evolve. My fundamental philosophy works (for me) in self-contained as well as integrated courses."

- "Team taught for more than twenty years and has changed very much as a result of that experience."

- "We can set or gather scoring criteria together and share concerns. We split the paper load(often according to our subject matter interests)."

Appendix G
Teachers' Written Responses on Surveys (Page 8 of 8)

Question C4

• "I would be hesitant to teach in a block again without being positive that we are compatible in styles and goals."

• "I have always believed students need to increasingly design and direct their own learning so that they can become competent and confident life long learners. I have always looked for a variety of ways to record student accomplishment. I have had one semester-one class that truly evolved a plan that I and they were 100% content with. That class designed a portfolio system that left class time totally assessment free until the end of the term. All was devoted to delight and learning. The portfolios showed it, too."

• "We often felt that 'figuring out' how to assess was a bit of a drag, interfering with momentum. We found that students are good at assessing these learning experiences if we group the activities together at the end of a quarter and provide a framework for reflecting and thinking through their giving and receiving in the experiences. . . ."

• "Brain research is convincing."

• "After 17 years in a traditional classroom, the opportunity to teach secondary students in an interdisciplinary setting has changed my practice completely."