

ANALYSIS OF PERCEPTIONAL DIFFERENCES AMONG DEPARTMENT
CHAIRS, FACULTY, AND INSTRUCTORS TOWARD THE BARRIER
TO USING MULTIPLE TEACHING STRATEGIES IN
TWO-YEAR TECHNICAL AND COMMUNITY
COLLEGE ELECTRONICS COURSES

Jerry Emil Hutyra

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APPROVED:

Jeff Allen, Major Professor

Ron Newsom, Minor Professor

Roger Ditzenberger, Committee Member

Randy Schumacker, Committee Member

Jon Young, Chair of the Department of Technology and
Cognition

M. Jean Keller, Dean of the College of Education

C. Neal Tate, Dean of the Robert B. Toulouse School of
Graduate Studies

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CHAPTER 1

Background

As the world rapidly changes in its technological innovativeness, today's American two-year technical and community college system is adapting to technology's alterations by avoiding obstacles promoting passive classroom teaching practices. Interactive technologies create new roles for teachers, present opportunities for and barriers to effective instruction, affect student and teacher satisfaction, and demand increased teacher time in learning emerging interactive environments (Gallihier, 1995). Research studies suggest obstacles to effective instruction that include student barriers, resource barriers, classroom environmental barriers, and teacher training/teaching technology barriers. These perceived obstacles can be real and their impact upon any organization of higher learning is enormous. Awareness of these perceived barriers will make the teaching and learning process more meaningful and rewarding (University of Florida, 1998).

By the year 2000, it is estimated 85% of the population of the United States will require some type of education beyond high school to meet the needs of the workplace (Illinois Community College System, 1995). Obviously, this need will require some avenue to turn to for valuable training. Because of their convenience, accessibility, and affordability, our nation's two-year technical and community colleges are a crucial link to the future work world. The two-year technical and community colleges, as institutions, are important innovations in the history of higher education (O'Banion, 1989). Two-year technical and community colleges, however, are witnessing critical

changes in an area of expertise: the classroom.

Indeed, classroom and laboratory teaching strategies have become complex and often frustrating due to many contingencies including inadequate teacher training and inadequate financial resources (Parnell, 1990). Furthermore, changing technologies and demographics requiring the way teaching and learning are achieved have been altered (Halpern, 1994). What's more, technology is such a major player in the field of education that institutions of higher education, most notably two-year technical and community colleges, have no choice but to upgrade regularly the technology they use to reflect new developments and applications in the workplace (O'Banion, 1997).

Most forms of education, particularly technical education, require an array of instructional mechanisms for training a diverse population. The Texas State Technical College System, for instance, uses a variety of multiple teaching strategies including, but not limited to, lecture and discussion, "hands-on" laboratory performance exercises, collaborative learning, computer-assisted instruction, distance learning, simulation, and on-the-job internships. These multiple teaching strategies are developed to ensure that post-secondary students develop the knowledge, attitudes, and necessary skills for success in their career fields. These teaching strategies involve cognitive, affective, and psychomotor learning outcomes using the latest, most advanced technologies needed for a college classroom environment. Have these strategies proved advantageous to students? Comments from the field by both employers and graduates of the Texas State Technical College System indicated the techniques are positive but more work and research is needed (Texas State Technical College at Waco/Marshall Report, 1998).

Two-year technical and community colleges must be flexible enough to adapt to diverse students and their changing goals (Illinois Community College System, 1995). The Illinois Community College System noted it is imperative that institutions of higher learning build their educational programs around a rapidly changing and expanding business and industry environment, developing a highly skilled workforce with cross-cultural, cross-racial, and cross-gender skills. For example, Parnell (1990) stated technological advances will require colleges, universities, and the American corporate sector to work more cooperatively in a “search for synergy,” producing greater harmonious relationships among the nation’s diversified population. Carr-Ruffino (1996) stated a diverse workforce increases the potential for creativity and innovation, and leaders must set the stage for inventiveness to occur. According to Omaha Public Schools (1998), multiple teaching strategies have given educators three major advantages in the classroom. These returns include: (1) mind-to-mind interaction between teachers and students that is refined and supported; (2) multiple teaching strategies reflect effective teaching practices and have the potential for achieving learning goals with all students; and (3) learning goals are more demanding and, therefore, students push for greater achievement.

Research has shown that traditional methods, in which professors talk and students listen, have dominated college and university classrooms (Bonwell & Eison, 1991). Teaching higher-order levels of learning is now needed, whereby a divergent arrangement of instructional concepts promote cognitive thinking using analysis, synthesis, and evaluation (Kerka, 1992). Bonwell and Eison (1991) stated the use of these

techniques in the classroom is vital because of their powerful impact on student learning. Halpern (1994) stated that professors must engage their students in active learning techniques-ways that help students develop skills rather than the professor simply transmitting information to them. Does applying multiple teaching strategies in an electronics classroom promote active learning? According to the University of Indiana State Center for Learning (1998), educators can use learning styles as reasons to create multiple teaching strategies that supplement or replace traditional ones with greater success. Furthermore, the Center for Learning has found multiple teaching strategies offer better learning opportunities for all students and any perceived barrier impeding this process frustrates the state of learning and gaining knowledge.

McKeachie (1989) alluded to the fact that instructors who ask thought-provoking questions, rather than presenting statements of fact, increase student learning, interest, and curiosity. Svinicki (1990) stated visual enhancements, summaries, contrasting ideas, the surprise or suspense factor as a motivator, and humor are all used constantly in communicating with the public and make just as much sense when we think about ways to communicate with our students. As our students become more and more diverse, so must our ways of teaching them (Cole, 1995).

Significance of Study

Across the nation, two-year technical and community colleges are attempting to expand the knowledge and skills of students. Innovations in educational technologies have provided emerging shifts in focus from teaching to learning (Anandam, 1989). Today's technological world, with its rigorous challenges, exemplifies the extreme

importance in preparing students for the job market. Students in technical or community colleges will face changes and advances in the workplace we cannot even guess at today (Halpern, 1994).

Education has been impacted significantly by the demand for graduate assessment and accountability from state and federal legislative bodies and the public news media (Seldin, 1995). Seldin (1995) asserted that public outcries demanding teacher accountability have roused legislators and governing boards to action. Jones (1994) confirmed citizens and institutions are demanding that classroom instruction dramatically increase learning effectiveness. An educator's primary responsibility is to produce graduates worthy of prestige and recognition, provide outstanding community service, and exemplify positive work ethics and peer cooperation (Jones, 1994).

Information gained from this study will provide insights into perceived barriers to implementing multiple teaching strategies in post-secondary technology programs. If technical and community colleges do not remove these perceived barriers, they cannot realistically expect to fulfill their mission (Illinois Community College System, 1995).

“The principal goal of universities and colleges is that students should learn to the maximum of their capability, and for that, they need good teaching. We need to attach more status to teaching and learning” (Fender, 1997, p. 1). Braun (1987) affirmed that teaching has never counted for much in higher education or in the careers of those who work in higher education. He stated when college faculty present themselves for reappointment, promotion, or tenure, what is evaluated are indicators of scholarship, not the art of teaching and pursuing knowledge.

Theoretical Framework

In 1992, the American Psychological Association asserted “effective instruction focuses on the active involvement of students in their own learning, with opportunities for teacher and peer interactions that engage students’ natural curiosity” (as cited in Halpern, 1994, p. 11). What impact does active learning have on using multiple teaching strategies in two-year technical and community college electronics courses? Do multiple teaching strategies really play a significant role in transferring knowledge from the teacher to the learner?

Active learning induces higher order thinking skills, which are essential and must be taught (Kerka, 1992). Kerka explained that recent findings of cognitive research on higher-order thinking have provided a better understanding of how people learn and solve problems, from which new teaching strategies are emerging. Experiential learning and many other participatory methods of instruction require active learning, which is more likely than passive learning, to be integrated with what we know, and thus, not soon forgotten (Frederick, 1989).

The presence of a culture supportive of teaching clearly enhances the effectiveness of all teaching strategies for improving instruction (Paulsen & Feldman, 1995). Higher education needs the complete and total support of its constituents. The changing nature of society and of the world can revitalize the technical and community college curriculum and create a vast array of exciting possibilities, if we plan and prepare appropriately (Halpern, 1994).

Cultural patterns have changed over the past two decades ushering in new

demands for classroom teaching practices (Brown, 1996). According to Halpern (1994), all academic disciplines must respond in new ways to the changing composition of the student body and to the need to be multiculturally literate. The training needs of today's students are diversified and dynamic and do not address demands of the work world. Higher education in the United States has been challenged to improve students' learning experiences (Travis, 1996).

There are likely to be perceived barriers to implementing multiple teaching strategies. Bonwell and Eison (1991) stated some of these obstacles are likely to be with the educators themselves, through traditional, outdated beliefs with the risks associated in using active learning strategies. Other types of difficulties include outdated administrative policies and procedures, poor student preparation for college, and inappropriate budget restraints for instructional improvement (National Center for Research to Improve Postsecondary Teaching and Learning, 1989). Many students in today's two-year technical and community colleges are the first generation in their family to enroll in a post-secondary program. These students, in many cases, are required to enroll in remedial classes to bring their foundation skills up to the required level for entering college.

Purpose of the Study

The purpose of this study was to identify and analyze perceptual differences among department chairs, faculty, and instructors toward the barrier to using multiple teaching strategies in two-year technical and community college electronics courses. Four areas that perceived barriers occur in will be researched: (1) perceived student

barriers, (2) perceived resource barriers, (3) perceived classroom environmental barriers, and (4) perceived teacher training/teaching technology barriers.

Statistical Hypotheses

Two hypotheses were formulated for this study:

Ho1. There are no significant differences among the perceptions of department chairpersons, faculty, and instructors toward the four perceived barriers to implementing multiple teaching strategies in a post-secondary electronics program.

Ho2. There are no significant differences in the perceptions of electronics faculty members categorized by years teaching experience toward each of the four perceived barrier categories to implementing multiple teaching strategies in a post-secondary electronics program.

In this research study, the independent variables were department chairpersons, faculty members, and instructors. The dependent variables were the four perceived barriers to utilizing multiple teaching strategies: (1) student, (2) resource, (3) classroom environmental, and (4) teacher training/teaching technology.

Delimitation

There is one delimitation presumed by the researcher for this study. This study involved faculty chosen from two-year technical and community college environments that have electronics programs in the state of Texas.

Limitations

There were four limitations in conducting the study. First, if the person to whom

the letter is sent is no longer employed at a particular school, there were no plans to have their replacement fill out the questionnaire. Second, none of the participants in the study were required to fill out the assessment instrument; they were only encouraged to participate. Third, every two-year Texas community college was not utilized in the inquiry due to the lack of electronics educational training within some institutions. Fourth, numerous perceived barriers have a direct or even indirect impact upon using multiple teaching strategies. This study, however, focused on four major perceived areas against effective teaching: student barriers, resource barriers, classroom environmental barriers, and teacher training/teaching technology barriers.

Definition of Terms

The following terms were defined for this study:

Barriers: Obstacles, factors, or detours that have the tendency to impede or stop the flow of new information and knowledge.

Class Discussion: An informal training method that uses a leader or moderator to guide the sharing of learners' information and experience.

Classroom Environmental Barriers: A negative undertone to an instructional area's surroundings and atmosphere. These include lighting, temperature, seating arrangement, noises and distractions, student discipline, class size (number), and amount of class time.

Collaborative Learning: A training strategy whereby participants are grouped or arranged in order to share collectively their thoughts and opinions so that a group consensus is reached regarding a solution or outcome to a particular situation.

Computer-Aided Instruction (CAI): Computer-generated programs in which the learner follows a sequence of planned instruction at his or her own pace.

Demonstration: An action in which a trainer shows learners how to successfully perform a given task through illustration, explanation, and skill performance.

Experiential Learning: A training strategy in which participants are active learners involved in the concepts of knowledge, activity, and reflection of information.

Lab Simulations: An activity whereby participants are assigned roles to act out a given situation in order to solve a problem or achieve understanding.

Lecture: A popular training method in educational institutions where an instructor or trainer “stands and delivers” information to be learned.

Multiple Teaching Strategies: Instructional tactics and activities used by teachers, instructors, and other training personnel for helping learners progress from where they are to where they must be (Bonwell and Eison, 1991).

Resource Barriers: Pertaining to a lack of money, equipment, or personnel that is detrimental or hinders effective classroom instruction.

Student Barriers: Individual, personal, negative connotations presented by a classroom learner towards the learning process.

Teacher Training Barriers: Activities or actions that hinder or stifle the learning process developed through faculty preparation.

Teaching Technology Barriers: Negative conditions, circumstances, or situations that inhibit the latest, state-of-the-art, teaching techniques and practices utilized by faculty members to promote the learning process.

Summary

This study utilized two hypotheses to identify and analyze perceptual differences among department chairs, faculty, and instructors toward the barrier to using multiple teaching strategies in two-year technical and community college electronics courses. A review of the historical background supports the significance and purpose of the study to analyze some of these perceived barriers in Chapter One. Chapter Two reviews the research on this subject and includes substantiated support for examining questions related to perceived student barriers, perceived resource barriers, perceived classroom environmental barriers, and perceived teacher training/teaching technology barriers. In Chapter Three, the methodology reveals what general design instrument was adopted and how the facts were gathered and studied in detail. In Chapter Four, findings are discussed related to the hypotheses. In Chapter Five, the author presents conclusions and recommendations along with a final summary.

CHAPTER TWO

Review of the Literature

This study was designed to identify and analyze perceptual differences among department chairs, faculty, and instructors toward the barrier to using multiple teaching strategies in two-year technical and community college electronics courses. This area of research attempts to elaborate on the history of these obstacles and substantiate existing inquiries in this field. To overcome these restraints involves exceptional, creative work by the college instructor or professor. Conquering obstacles to reach skillful, effective teaching strategies supports student-learning goals and promotes knowledgeable creativity (Theall & Franklin, 1991). The quality of teaching is best evaluated, not simply in terms of what students learn, but in terms of the probability that all students will be motivated to do their very best work in any course and emerge changed for the better, often in personal ways that go far beyond course content (Lowman, 1995).

Perceived Barriers

Endeavoring to better understand the nature of perceived barriers to utilizing multiple teaching strategies, this author wishes to convey these short informative insights on this subject to the reader. O'Banion (1997) states that resistance to change is a hallmark of higher education and perceptions to these changes may create barriers.

Professing that certain superficial obstacles or factors have a tendency to stop the flow of new information and knowledge can be interpreted as hindering an educational process. Thus, the learning process suffers and new information cannot be learned and retained (Halpern, 1994).

Multiple Teaching Strategies

In this research project, multiple teaching strategies will be defined as instructional tactics and activities used by teachers, instructors, and other training personnel for helping learners progress from where they are to where they must be (Bonwell and Eison, 1991). Thus, according to Bonwell and Eison, the use of multiple teaching strategies tends to promote enhanced learning opportunities.

The greatest obstacle to the initiation of students into academic life is not their own deficiencies, but the fact that colleges tend to be unselfconscious about how their curricula and teaching strategies shape students (McGrath & Spear, 1991). Few educators would argue that the lecture setting is the most effective venue to promote learning.

Research conducted by Geske (1992) suggested the lecture setting may contribute to the difficulties of learning in the college environment. Further research by Geske on the lecture strategy indicated a type of student syndrome characterized by a loss of identity, feelings of unreality, and strangeness of personal behavior. Additional research work by Nelson (1996) and Treisman (1992) strongly suggested that a straight lecture course is unlikely to be as effective overall as one making extensive use of structured discussion.

Contrarily, Wilson (1996) conducted an experiential learning design at Kansas Community College to determine if class discussions were effective in improving teaching quality and enhancing the learning process. After an analysis of final course grades, Wilson found no significant differences in the grades, suggesting that class

discussion was no more effective than the lecture. Based on student comments, however, students exhibited more positive behavior to the class discussion.

Collaborative learning strategies have received an increased amount of attention in the academic field. A research project conducted by Bracy (1993) used collaborative groups in an introductory college research course. Bracy's research found the optimum size for collaborative groups is between four and seven. It was decided to form learning groups using Kolb's Learning Style Inventory, since it was presumed that this would enhance group cohesion. After administering a 17-item test instrument using a scale of 1-5 with 5 being the highest, Bracy reported that the average rating was 4.0 and the mean was 3.8. Thus, Bracy's research indicated collaborative groups enabled students to exchange views and opinions and increase their understanding of the structure of research in a positive way.

Other research on collaborative learning strategies included a description of strategies on how to manage the process of implementing cooperative groups (Cooper & Mueck, 1990). This research provided educators with a proven, systematic method for using and administering cooperative groups in a classroom environment. Hawkes (1991) research established guidelines in assessing the tasks, knowledge, skill, and time frame for successful execution of classroom collaborative learning. His studies provided three guidelines for group questions for a fifty minute class: (1) limit number of questions to two or three; (2) organize questions in such a way that it moves from low to high involvement; (3) make all questions open-ended, i.e., do not ask factual questions.

Lab simulations provided excellent opportunities for teachers to create settings

where students are led through critical thinking stages (University of Indiana State Learning Center, 1998). According to this research, cognitive thinking barriers associated with any cultural sensitivities hindered the learning cycle of a classroom laboratory simulation. Overall, lab simulations stimulated the classroom atmosphere with new concepts and bridged the work environment through actual, true-to-life activities.

Classroom demonstrations are another teaching strategy found in today's modern teaching institutions. Research conducted by Garvin (1993) regarding the building blocks of a learning environment suggested the use of demonstration projects in a training program. Through the effective usage of classroom demonstrations, ambitious undertakings by any instructional staff will aid in designing new personal concepts, allowing individuals to gain confidence, performance skill, and professional job-related experience. Further research by Kirkpatrick (1977) indicated demonstration activities are effectively used as evaluation techniques, allowing teachers to obtain a fairly objective assessment of the learning taking place.

According to Williams & Brown (1991), computer-aided instruction (CAI) is a form of hypermedia instruction that includes drill and practice. The computer reinforces concepts introduced in the classroom, presents lessons and practice exercises, and gives a dialogue as it asks the learner questions. The Kuliks and their colleagues at the University of Michigan conducted a well-known research study on CAI. Kulik & Kulik (1987) reported the following overall results: Students learned more in classes where they had some form of computer assistance. The average effect over 199 studies was to raise exam scores by 0.31 standard deviations, that is, from the 50th to the 61st percentile.

Additionally, their studies revealed possible reductions in instructional time by as much as 32%. Another study conducted by CAI specialist Greg Kearsley involved the design of a checklist on the advantages as well as disadvantages in using CAI. Kearsley pointed out, “For any course that involves students with diverse backgrounds or ability levels, computer-based instruction can be very worthwhile” (Eurich, 1990, p. 92).

Perceived technical and community college teaching barriers often distort the very existence of instructional diversity and true learning. Too often, the spirit of exploration, adventure, and discovery rarely appear because the conditions for training do not prescribe or enrich these teaching qualities (Weimer, 1990). Educators need to actively pursue new paradigms of teaching excellence through profound “risk-taking” so that instructional diversity is recognized, valued, and cultivated.

Student Barriers

After the end of the Korean War, the United States witnessed transformation in the profile of its most valuable resource-its people. Nowhere else in the world were diversity, cultural heritage, and social awareness dominant forces as in America. Forrest (1987) stated that during the past forty years, higher education enrollment in the United States increased 400% and student profiles changed dramatically as well (as cited in Halpern, 1994). Brown (1996) further stated that more than 3,400 colleges and universities existed in the United States employing approximately 719,000 faculty members. Most of these institutions were caught in a vortex of changing conditions. For example, Parnell (1990) stated that significant changes are expected in the type of futuristic work performed by the American labor market. These changes hold some

significant implications for all colleges and universities. Parnell (1990) further stated these workers must develop higher levels of problem solving, reasoning abilities, computer literacy, and the ability to apply knowledge.

The socioeconomic and cultural pattern of students has changed over the past two decades ushering in new demands (Brown, 1996). Personal awareness, technological creativity, and a willingness to be more open-minded, has increased with the trend of multiculturalism. Teaching in this nation's institutions of higher learning, for example, requires sensitivity to different communication styles toward individuals having varied cultural backgrounds (University of Idaho, 1998). In turn, compatibility, harmony, and civic responsibility among homes, communities, and local school environments have been advocated as described by Martinez and Ortiz de Montellano (1988). "In a world complicated by such social and technological problems as pollution, disease, illiteracy, and congestion, we need divergent viewpoints, different abilities, and diverse values to address these problems. No single set of skills, attitudes, temperament, personality, or aptitude can provide all that is needed to solve our problems" (Borich, 1992, p. 62).

Culturally-relevant science subjects can have multicultural derivations, e.g., using male and female scientists from various ethnic groups as role models. Goldstein (1994) emphasized all faculty must make a genuine commitment to multicultural education. This means working with each individual's prejudices and stereotypical thinking patterns. In fact, all facets of instruction and any knowledge relevant to the completion of any higher degree must lead to a culturally congruous enlightenment of wisdom, abundant and diverse in heritage. Collaborative learning strategies, for example, have been found to

have a positive impact in the areas of self-esteem and sensitivity to racial, ethnic, and gender differences (Cooper & Mueck, 1990).

O'Banion (1989) stated new immigrant populations have encouraged the establishment of an array of new programs in two-year technical and community colleges. Local two-year technical and community colleges in Central Texas, i.e., Austin Community College, Blinn College, Central Texas College, Hill College, McLennan Community College, Navarro College, Texas State Technical College at Waco/Marshall, Temple College, and Weatherford College are serving as cultural centers with major forces poised for institutional reform and renewal.

Besides cultural heritage, the modern day college classroom atmosphere exhibits age differences, changing life styles, etc. Lowman (1995) confirmed the college classroom is a dramatic arena first and a setting for intellectual discourse second; it is also a human arena, wherein the interpersonal dealings of students and instructors-many of them emotional, subtle, and symbolic-strongly affect student morale, motivation, and learning. For educators, the question is not simply one of trainable skills or attitudes but recognizing that people who have fundamentally different instincts are in the classroom (University of Indiana State, 1998). Additionally, students are unlikely or unable to be successful when limited to activities not compatible with the attitudes brought into the learning situation.

Today, more than ever before, the focus of the classroom remains with the student and not the content (Svinicki, 1990). Svinicki (1990) stated active learning rather than passive learning is vitally needed and constitutes greater student success. Svinicki also

found teaching students active learning concepts entitled educators to sense what students think and react to.

In the instructional classrooms at Texas State Technical College, educators have observed an increase in the number of non-traditional students, i.e., displaced workers, single parents, and older adults. O'Banion (1989) stated the needs and visibility of these new groups have challenged the innovative spirit of technical and community college faculty who are beginning to respond with renewed interest.

Hartnett (1972) noted higher education has often failed to view its adult learners as unique from traditional students, and, as a result, has not recognized that their diverse interests and needs could be better met with less tradition and more flexibility. According to Parnell (1990), part-time college attendance has increased and colleges and universities have offered a broaden spectrum of classes in the evenings and on weekends to meet the needs of the expanding part-time and adult student population. Hartnett (1972) further stated higher education needs to consider changes in its structure, if it is to continue serving a growing constituency of adult learners, or face losing its community mission. There will be a need to streamline student services to accommodate adult learners, and many students will have dual roles as collegians at night and workers during the day.

America's two-year technical and community college system is rapidly changing and must ready itself to deal with a wide variety of transitions as it enters the next millennium. As Pat Choate, Vice-President of TRW, Inc., stated, "America's success in meeting the challenges of swift, far-reaching, uncertain change depends primarily on how

we will develop and apply the knowledge, skills, wisdom, enthusiasm, and versatility of the nation's prime resources, the American people" (Parnell, 1990, p. 35).

Resource Barriers

For many American colleges and universities, the costs of providing educational opportunities have skyrocketed over the past several years. Most two-year technical and community colleges are struggling to operate within an established paradigm that is failing due to inadequate resources (O'Banion, 1997). O'Banion stated the scarce assets of many colleges have been used to improve the traditional system, often at increased costs. The American educational system must endeavor to allocate its resources in a much more efficient mode.

As higher education budgets diminish, technical and community colleges have experienced a disproportionate loss of funds for deferred maintenance, laboratories, libraries, and student assistance as well as faculty raises, travel, and sabbaticals (Brown, 1996). Much of this "lost funding" is attributed to an increase in student loan defaults, the federal deficit scenario, and mounting pressures from state governments for accountability of educational programs (Parnell, 1990). The final results of these actions will mean higher tuition and other fees.

With the costs of education continuing to soar, technical and community colleges throughout Texas are zealously seeking financial resources from corporations and industries. Caro and Morris (1993) established that local industries are likely sources of funding for technical and community colleges which have training programs tailored to the personal needs of the local industry. Innovative college and private sector

connections such as joint technical training, apprenticeship training, customized on-site training, and even equipment sharing have resulted in extensive human resource development for many local communities. Both campuses at Texas State Technical College in Waco and Marshall, for example, have entered into partnerships with industries throughout Texas, e.g., Raytheon E-Systems, Alcoa, Sematech, and General Motors, just to name a few. Additionally, the Texas State Technical College System has taken an active role in pursuing and building partnerships and educational agreements with other colleges throughout Texas (Texas State Technical College at Waco/Marshall, 1998). For example, Eastfield College in Mesquite, Texas, and Texas State Technical College at Waco have offered a joint associate of applied science degree in diesel mechanics. Other partnerships in the making include Wharton County Junior College and Central Texas College in Killeen. These partnerships are necessary due to the ever-increasing demand for highly trained labor and aid in the direct involvement of local development for technical and community colleges (Texas State Technical College at Waco/Marshall, 1998).

With adequate financial assistance and the technical guidance of industry, new stimulants can help create more advanced teaching strategies (Caro and Morris, 1993). Only through the full support and backing of the corporate world as well as federal, state, and local legislative bodies will many post-secondary institutions be capable of meeting or exceeding their goals and objectives for improving teaching and overcoming unnecessary financial asset barriers (O'Banion, 1997).

Classroom Environmental Barriers

Although there are numerous perceived environmental barriers to using multiple teaching strategies, design elements of the classroom, class size, and time allotted for the instruction appear to have the most profound influence upon the educational process (American Society for Training and Development, 1989). The American Society for Training and Development established that any room in which training is conducted sets the mood for the meeting and, in conjunction with this condition, can either help or hinder learning transfer. This may include the physical comfort of the trainees, amount of distractions, interaction of the participants, and the reachability of the worksite. Likewise, the American Society for Training and Development (1989) further stated the climate of a learning classroom is a direct result of the actions and activities of its participants. If students are not learning, the teacher needs to change his or her approach to teaching them (Cole, 1995).

On many occasions, instructional staff have very little input into the environmental conditions, i.e., heat, noise, and light, of a classroom. However, according to Polson (1993), seating arrangements may be altered enough to accommodate and encourage better student involvement and discussion despite the environmental conditions. Redesigning seating arrangements may promote an active learning environment. Rather than using conference tables, the use of smaller modular tables that tend to enhance the school classroom atmosphere may work best when delivering a great deal of information (American Society for Training and Development, 1988).

Class size is a major perceived barrier when using multiple teaching strategies. According to Wergin (1995), faculty have found teaching large classes is more than just

adjusting to the annoyances it presents; they have discovered the need for patience, creativity, and supreme self-confidence. McKeachie's (1989) research suggested the importance of size depends upon educational goals and that large classes are simply not as effective as small classes for retention of knowledge, critical thinking, and attitude change.

The edification of knowledge and thinking are not enough. Colleges and schools need to realize the importance of time in the classroom. According to McKeachie (1994), our ever-present pressure to cover the content may, in fact, weigh against effectiveness in teaching and thinking because we fail to allow time for it. You don't become a skillful artisan or football player merely by listening to an expert two hours a week. As teachers, we need to give our students opportunities to talk, write, do classroom or field projects, or carry out other activities that stimulate or reveal their knowledge and thinking (McKeachie, 1994).

Learning is more than just passively absorbing information. It must become an active learning experience full of innovative concepts and bright ideas. Guenter (1994) stated that challenging students with devising solutions promotes active involvement in classroom discussions. The idea is to make concrete and abstract connections with other participants and have fun in the process.

Teacher Training/Teaching Technology Barriers

Teacher Training Barriers

The quality and quantity of trained teaching personnel is a major component of concern for every institution of higher education. It has been estimated that

approximately one-third of all technical and community college faculty members will retire in the next five years (O'Banion, 1989). Large-scale faculty retirements will challenge technical and community colleges to strengthen the faculty recruitment and selection process, particularly if the number of ethnic minority faculty is to be increased (Parnell, 1990). In addition, Parnell (1990) stated this challenge may provide colleges with a greater opportunity for renewal and reconfiguration of faculty patterns.

Today's faculty member needs to have an extensive outlook on teaching strategies with emphasis in making the art of learning fun. "Educators can generate much of the excitement and energy they desire by introducing creativity into the lives of their students and by supporting their desire to know. The practical consequence is that a student's desire to know more about a subject is more important than a measure of performance at any point in time" (Caine & Caine, 1991, p. 134). A variety of instructional styles and modes, student participation in learning, and student outcomes assessment will have a profound impact on learning (Goldstein, 1994). Likewise, technical and community college teaching, and those who perform it, must learn to deal with and keep abreast of technological changes occurring in their specialties (Galliher, 1995).

Today's technical and community college teachers must cooperate as a cohesive assembly, sharing and providing their unique expertise with others who may be less fortunate. As new faculty are employed by administrators, the results are likely to be energetic faculty members with great interest in innovative programs designed to increase access and quality for students in the technical and community colleges (O'Banion, 1989). The end results must have a solid, concrete foundation to sustain an

organization's goals, and all cooperative efforts must complement the team's individuals.

“The conclusion is clear. We need scholars who, not only skillfully explore the frontiers of knowledge, but also integrate ideas, connect thought to action, and inspire students. The very complexity of modern life requires more, not less, participation. If this nation's technical and community colleges cannot help students see beyond themselves and better understand the interdependent nature of our world, each new generation's capacity to live responsibly will be dangerously diminished”

(Boyer, 1990, p.77).

In light of the many changes occurring in the field of higher education, the teachers of today and those of tomorrow must realize that newer, more tactful instructional approaches are critically important to improving any student's educational career. As an example, Paulsen and Feldman (1995) concluded ways need to be found to “unfreeze” certain perceived attitudes and behaviors of teachers that prevent them from improving their teaching. Robbins (1992) mentioned the threat to academic freedom is usually foremost on the minds of teachers who believe that the classroom is a sanctuary. As one of his colleagues said to him regarding observation, “I wouldn't want anyone in my classroom; I'm afraid they'd change me” (Robbins, 1992, p. 42).

Cross (1994) proposed, in her address to the annual meeting of the American Association for Higher Education, that it is time to take teaching seriously, and college teachers should become knowledgeable professionals in their chosen career of teaching. She further stated classrooms are invaluable laboratories in which to investigate the effect of teaching on campuses and that all teachers should seek solid, sound methods of

improving learning in their classrooms.

Many faculty in institutions of higher learning have, regrettably, been procrastinating in the development of their personal teaching competence. According to Seldin (1995), faculty have mostly dragged their heels when it comes to professional development due to inferior concepts regarding the teaching discipline, failing to recognize the need for improvement, and lacking the personal motivation to become involved.

Svinicki (1990) established that faculty in any institution of higher learning are expected to inspire an instructional renaissance, thereby paving the way for a renewed commitment to the lifelong learning process. According to Weinstein (1994), trained, professional teachers should be actively promoting students to use effective learning strategies. They contend that one of the most effective and powerful ways of teaching these strategies is through modeling. A variety of styles and techniques can expose students to much information and thus, knowledge is expanded. Furthermore, Weinstein (1994) emphasized it is not enough to simply use strategies in our teaching, but we must train students on how to do this on their own when studying.

According to the National Association of Colleges and Employers (NACE), “colleges and universities need to concentrate on teaching students hands-on skills and ... should move away from the classroom as a think tank approach” (1998, p.1). Furthermore, NACE stated employers want educators to give students project management experience, opportunities to work in teams, and exposure to technology used in the workplace.

The technical and community college teacher of the future will need to become not just a simple “stop-off” for information and knowledge, but rather, someone who practices and promotes innovation, higher-order thinking skills, and a willingness to explore other teaching paradigms (Kerka, 1992). Kerka went on to say that these professionals must become “instrumental activists”, assisting students to become explorers and researchers, utilizing new innovations of learning to seek higher realms of knowledge and learning. If a major goal of education is to produce lifelong strategic learners, then it is the responsibility of each technical and community college instructor and professor to teach students how to learn as well as what to learn (Weinstein, 1994).

Teaching Technology Barriers

Inadequate equipment resources for classroom teaching can effectively ruin any institution’s image of being on the “cutting-edge” of modern technology. According to Galliher (1995), a prerequisite for effective teacher use of technology is access. Colleges, in the past, have made substantial investments in hardware and software, much of which is now outdated. Deegan and Tillery (1985) emphasized that technical and community colleges cannot produce the best students without qualified teachers and the best equipment.

The University of Stanford Education Department (1998) found that access to information sources changes rapidly. It is imperative information professionals, vendors, and database producers must provide effective teaching materials at reasonable cost, publicize their availability, and make them readily available (Galliher, 1995). Albright (1996) stated a lack of commitment to technology at the highest echelons of

administration can be disastrous. Any technical or community college with a poor financial plan for purchasing equipment, maintenance, and the support of modern technology risks the possibility of putting itself “out of business”. Green (1994) discovered chief academic officers had no involvement with instructional technology at about a third of the institutions in the United States.

Modern technology provides the extra benefits of creativity and better problem-solving techniques, enriching the human mind with knowledge (Albright, 1996). However, there are the costs. Schmeltzer (1995) emphatically stated equipment costs if you do it well; costs more if you do it poorly; and it costs even more if you don’t do it at all. For example, Albright (1996) stated just about every technical or community college campus has closets full of technology that do not work simply due to unrealistic purchases. Additionally, Albright (1996) stated the presentation hardware and software industry in this country rang up \$31 billion in sales in 1993, but for some reason, relatively little of that showed up in this nation’s technical and community college classrooms.

O’Banion (1997) confirmed a certain portion of the market for higher education and postsecondary education and training will embrace video-on-demand and will compete directly with more traditional providers stuck in time-bound and place-bound delivery models. This, in turn, will place a greater burden of competition for students upon technical and community colleges as these institutions shift their resources to educating and retraining older adults and workers (O’Banion, 1997).

Any two-year technical or community college investing valuable resources in

state-of-the-art technology cherishes its identity as an up-and-coming institution of the future. The implications of utilizing modern classroom teaching equipment are tremendous and the risks great, but the rewards are spectacular and powerful.

Summary

It is apparent institutional teaching at the post secondary level carries with it factors that can have a significant impact upon the learning process. Overcoming perceived barriers to utilizing multiple teaching strategies must become the prime objective for any two-year technical or community college. The real challenge to the technical and community college system is to provide the needed training for a growing number of the population who, only now, are beginning to recognize the high skill levels that are demanded by our nation's economy (Illinois Community College System, 1995). Some of the background knowledge and historical facts on barriers found in using multiple teaching strategies in a two-year technical or community college training environment have been outlined in this chapter.

The scope of this study addresses identifying and analyzing inconsistencies occurring under the four perceived barrier categories: student, resources, classroom environmental, and teacher training/teaching technology. These areas will now be addressed in Chapter Three.

CHAPTER 3

Research Methodology

Introduction

Teaching strategies should reflect effective teaching practices and should have potential for achieving learning goals with all students (Omaha Public Schools, 1998). The similarities and differences of some perceived teaching barriers in two-year technical and community college electronics training courses taught throughout Texas has been presented in the previous chapter.

This chapter is divided into eight sections: (a) population of study, (b) instrumentation, (c) pilot study, (d) instrument validity, (e) instrument reliability, (f) procedures, (g) statistical analysis, and (h) summary. Each of these will now be discussed in detail.

Population of Study

This research is based on responses from each Texas two-year community or technical college having electronics programs as listed under the Texas Community College Teachers Association electronics division handbook (TCCTA, 1999). There are approximately 46 schools (including extensions) that have electronics training programs. These 46 institutions of higher education represent 51% of the total number of state-wide technical and community colleges. There are approximately 246 ($n = 246$) electronics-training faculty in these institutions. These electronics training faculty and instructors comprise a wide assortment of electronic-related occupations and teaching experience.

A target population offers a method of collecting statistical data. Through targeting a population, a researcher receives some idea how the populace may perceive and react to the stimulus of the study.

A letter of introduction and permission statement (see Appendix A) were prepared in advance and mailed to each institution's chief administrative officer. Over a period of some 2-4 weeks, each institution mailed their approval requests to the researcher. After four weeks, those schools not replying were sent an e-mail message (see Appendix B), alerting them to the necessity of mailing their approval slip as soon as possible.

Instrumentation

The instrument used for this inquiry was developed by the researcher using the investigative mechanisms based upon the literature review and existing training programs where perceived barriers occur, e.g., the specialized curriculums at Texas State Technical College (TSTC) Waco. The researcher contacted Subject Matter Experts (SMEs) in the field of higher education to substantiate the instrument. These Subject Matter Experts (SMEs) were all from Texas State Technical College in Waco, Texas and their names and titles are given:

Dr. John Knue, Instructor/Staff Development Officer

Dr. Darline Morris, Director/Instructor, Institutional Research & Planning

Dr. Robert Gentry, Master Instructor, English Department

Mr. Wayne Blinka, Cluster & Department Chair/Instructor, Electronics Core

Ms. Sharon Abernathy, Instructor, Biomedical Equipment Technology

Mr. Sidney Bolfing, Instructor, Electrical Systems Technology

Ms. Donna Wishon, Department Chair/Instructor, Telecommunications Technology

Mr. Todd Ewing, Department Chair/Instructor, Laser Electro-Optics Technology

Mr. Edward Enfield, Instructor, Electronics Technology

Mr. Carl Ervin, Instructor, Electronics Core

These individuals were chosen based on the fact they are faculty from various TSTC Waco departments and have strategic instructional expertise.

This questionnaire employed a “general statement” design intended for ease of grading and evaluating responses from each faculty member. Each faculty member was informed that this assessment instrument was coded and the coding was used for research purposes and the respondent’s identity would not be revealed. The questionnaire was used to obtain in-depth feedback from presently employed two-year community and technical college electronics training personnel. The instrument specifically targeted electronics teaching faculty and was composed of questions about perceived barriers to using multiple teaching strategies in a post-secondary electronics program.

Pilot Study

A pilot study was planned using 10 teaching personnel at Texas State Technical College Waco. This location was chosen because of the ease of access to the faculty and the institution’s close proximity to the researcher. An Institutional Review Board (IRB) application was submitted to the University of North Texas and IRB approval was obtained prior to conducting the pilot study. The research instrument was critiqued by each faculty member and appropriate improvements formulated.

Some of the improvements made were rewording statements, change existing grammar and punctuation, and modify sentence structure. The Subject Matter Experts were also able to provide additional comments, sort out duplication, and assist in keeping the questionnaire's overall objectives in line with its purpose. Each member was given approximately two weeks to recommend any revisions and modifications they felt would benefit the questionnaire's finale.

Additionally, the pilot study supported the modification and revision of existing administrative procedures and directions for the participants in successfully completing the questionnaire instrument. These useful alterations aided in improving the validity and reliability of the questionnaire instrument and "tied up any loose ends" in its structure and format for brevity and clarity.

Instrument Validity

Carmines and Zeller (1979) defined content validity as the extent to which an empirical measurement reflects a specific domain of content. Gall, Borg, and Gall (1996) indicated content validity is the extent to which inferences from a test's scores adequately represent the content or conceptual domain that the test is claimed to measure. In this study, content validity of the questionnaire was established by developing an instrument with randomly selected items from the questionnaire and requesting a panel of ten Subject Matter Experts (SMEs) to evaluate its composition and purpose, rating each statement according to a particular pre-determined scheme, using the categories of the research study. To better aid in the analysis process and avoid any duplication, teacher training and teaching technology barriers were combined into one category in Table 1.

Table 1

Change in Perceived Barrier Categories

Five Perceived Barrier Categories (original) Four Perceived Barrier Categories (studied)

1. Student Barriers		1. Student Barriers
2. Resource Barriers		2. Resource Barriers
3. Classroom Environmental Barriers		3. Classroom Environmental Barriers
4. Teacher Training Barriers	→	4. Teacher Training/Teaching Technology Barriers
5. Teaching Technology Barriers		

Instrument Reliability

Gall et al. (1996) identified reliability as the extent to which other researchers would arrive at similar results if they studied the same case using exactly the same procedures as the first researcher. Carmines and Zeller (1979) defined reliability as the tendency toward consistency found in repeated measurements of the same phenomenon. They stated the more consistent results are given by repeated measurements, the greater the reliability of the measuring procedure. In this research project, the reliability of the questionnaire was conducted using Cronbach Alpha statistical data procedures.

Procedures

Initial contact of two-year community and technical colleges encompassing the

membership of the Texas Community College Teacher's Association (TCCTA) electronics division was made. Institutions of higher learning constituting this association and its division are located throughout the state of Texas.

Of the 46 institutions with electronics programs and the 246 participants, 43 (93.5%) elected to participate in the study. Three institutions (6.5%) failed to participate due to a lack of interest in the study or lack of cooperation with the guidelines of the research project. These three institutions had approximately 15 (6%) electronics faculty members who were unable to participate in the study. This left a total sample of 231 (94%), who elected to actively participate in this research project.

After approval from each participating institution, a school contact person was solicited via e-mail (see Appendix C) for their address so questionnaires could be mailed and distributed to each electronics faculty member in the school. Each contact person then forwarded these feedback forms to this researcher for immediate tabulation.

After approximately two weeks, e-mail notices (see Appendix D) were sent out to all contact persons failing to respond, requesting the immediate return of their questionnaires. After four weeks, a second mail-out with additional feedback forms and cover letters were forwarded to contact members, who called to say they never received their first packet. After six weeks, any non-respondent contacts were reached by telephone, requesting the immediate return of their appraisals.

The researcher prepared questionnaire packets in advance. Each packet included a copy of the 32-question instrument (see Appendix E), a cover letter explaining the purpose of the evaluation tool (see Appendix F), a list of words with definitions for

clarification of the statements (see Appendix G), and information on how the results were to be used by the researcher (see Appendix H). A statement on the cover letter (see Appendix I) indicated that participation was strictly voluntary according to the University of North Texas Institutional Review Board (IRB) process.

The data obtained from the completed questionnaires is processed and presented as “indicators,” identifying what significance and impact perceived barriers to multiple teaching strategies have in electronics training courses for two-year community and technical colleges. Analysis and contrast of the various answers and figures is used to develop some means of determining the effects these perceived barriers have in the immediate classroom environment.

The known statements from the faculty questionnaires were displayed using the Likert Scale of 1 (Strongly Disagree) to 5 (Strongly Agree). Each appraisal had the following: 8 items-perceived student barriers; 7 items-perceived resource barriers; 6 items-perceived classroom environmental barriers; and 8 items-perceived teacher training/teaching technology barriers. As mentioned previously, two perceived barrier categories (teacher training and teaching technology) were combined for analysis purposes. Therefore, these five classes of perceived barriers were combined into four categories (Table 1) and examined for their data results.

Each two-year technical and community college had its returns tabulated and the outcomes posted based upon the percentage of returns from that institution. Additional tables have been added to display the combined data so that a complete picture of the entire results can be observed.

Statistical Analysis

The data were tested using the Multivariate Analysis of Variance (MANOVA) statistical technique. A MANOVA is a multivariate procedure testing whether groups differ on more than one dependent variable. Furthermore, a MANOVA can assess group differences across multiple metric dependent variables simultaneously (Gall, Borg, & Gall, 1996).

In this research project, there are two groups: (1) combination Department Chairs/faculty, faculty, and instructors (both full and part-time); and (2) faculty members categorized by years teaching experience. Independent variables in this research project are department chairpersons, faculty members, and instructors whereas the dependent variables were perceived barriers in four categories: (1) student; (2) resource; (3) classroom environmental; and (4) teacher training/teaching technology.

Summary

In this chapter, various procedures and organized steps were identified in relation to the type of research methodology utilized by this project. Chapter 4 will introduce the reader to the outcomes and results of the questionnaire instrument.

CHAPTER 4

RESULTS

Introduction

This investigation yielded data permitting the development of answers to the research hypotheses posed for this study. The overall purpose of this study was to analyze and identify perceptual differences among department chairs, faculty, and instructors toward the barrier to using multiple teaching strategies in two-year technical and community college electronics courses. This chapter is organized into three main sections. The first section provides an overview of the targeted population's participants in the study. The second section contains a description of the data and statistical analysis used in the research study. The last section provides additional questionnaire data supporting this research project.

Participants in the Study

Electronics teaching personnel from two-year technical and community colleges throughout Texas were questioned regarding their cognizance and comprehension of perceived barriers in using multiple teaching strategies in their courses. The data obtained from these evaluations will be used in the analysis of the two hypotheses.

A total of 231 faculty, instructors, and department chairpersons were surveyed at various two-year colleges and technical schools throughout Texas. According to Krejcie

& Morgan (1970), a calculated random sample size for this population is approximately 145, $n = (\sqrt{2}/E)^2$. However, 150 questionnaires (65%) were returned and tabulated for this project. There were 131 (87%) who identified themselves as full-time employees and 19 (13%) as part-time. Of the 131 full-time personnel, 35 (27%) identified themselves as full-time Department Chairperson and faculty member; 55 (42%) identified themselves as full-time faculty; and 39 (30%) were identified as full-time instructors with 2 (1.0%) people identifying full-time “other”. Of the 19 part-time people, 16 (84%) were identified as part-time instructor; 2 (11%) identified themselves as part-time faculty; and 1 (5.0%) listed part-time department chairperson and faculty member. There were 34 (23%) who said they had less than 5 years of teaching experience; 22 (14%) with more than 5 but less than 10 years; 54 (36%) with more than 10 but less than 20 years; and 40 (27%) with more than 20 years.

Study Data and Statistical Analysis

The research design in this study is composed of a 32-statement questionnaire. This evaluation instrument solicited responses involving perceptual differences as mentioned in Chapter One. Data were coded and entered with the assistance of data entry services and research and statistical support at the University of North Texas. The data were analyzed using SPSS version 10.1. The specific findings for this chapter will be done with the following hypotheses:

Ho1. There are no significant differences among the perceptions of department chairpersons, faculty, and instructors toward the four perceived

barriers to implementing multiple teaching strategies in a post-secondary electronics program.

Ho2. There are no significant differences in the perceptions of electronics faculty members categorized by years teaching experience toward each of the four perceived barrier categories to implementing multiple teaching strategies in a post-secondary electronics program.

The Cronbach Alpha coefficients for each of the perceived barrier categories are shown in Table 2.

Table 2

Cronbach Alpha Reliability Coefficients (n=150)

Variables Items	Cronbach Alpha	Questionnaire
Student	.74	2,3,7,10,12,15,20,21
Resource	.40	4,5,8,r22,13,18,r29
Classroom Environmental	.69	r1,11,14,16,23,24
Teacher Trng/Teaching Tech.	.59	r6,r9,r17,19,r25,r26,r27,r28
r = reversed item	Trng = Training	Tech. = Technology

Ho1. There are no significant differences among the perceptions of department chairpersons, faculty, and instructors toward the four perceived barriers to implementing multiple teaching strategies in a post-secondary electronics program.

The questionnaire statements were selected and a MANOVA was performed on each barrier with the data [means (M), standard deviations (SD), group, and number of personnel for each category] given in Table 3. These findings indicated no significant

differences in the perceptions of department chairpersons, faculty, and instructors toward each of the four perceived barrier categories to implementing multiple teaching strategies in a post-secondary electronics program. In Table 4, a nonsignificant F was obtained; thus, the assumption of the equality of group dispersions has been satisfied (Gall, Borg, and Gall, 1996). To test for statistical significance of the difference between group centroids in a MANOVA, Wilk's Lambda (λ) was performed, indicating an $F = 1.23$, $p = .28$. Therefore, the perceptions of chairpersons, faculty, and instructors were, basically, the same, and thus, this study failed to reject the null for the first hypothesis.

Table 3

Mean Univariate F's With Scores on Student, Resource, Classroom Environmental, and Teacher Training/Teaching Technology Barriers by Position

Barrier	<u>Dept./P.C.</u> (n = 35)		<u>Faculty</u> (n = 57)		<u>Instructor</u> (n = 58)		<u>F</u>	<u>P</u> Value
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>		
Student	21.11	5.07	19.33	4.30	20.21	4.55	0.84	0.43
Resource	18.97	3.07	19.12	3.08	19.09	3.24	0.05	0.96
Classroom Env.	21.03	4.46	19.89	3.45	19.38	3.94	1.29	0.28
Teacher Trng/Tching Tech	17.40	3.70	17.72	3.42	17.91	3.84	0.38	0.69

* $p < 0.05$ Dept./P.C. = Department/Program Chair Trng = Training
Tching = Teaching Env. = Environmental

Table 4

Univariate F's of Barrier Categories by Position

Source	df	F	η	p
	Between groups			
Student	2	1.67	.022	.19

Resource	2	0.03	.000	.97
Classroom Env.	2	1.97	.026	.14
Teacher Trng/Tching Tech	2	0.22	.003	.81
SS within-group	147			

Ho2. There are no significant differences in the perceptions of electronics faculty members categorized by years teaching experience toward each of the four perceived barrier categories to implementing multiple teaching strategies in a post-secondary electronics program.

Once again, the questionnaire statements were selected and analyzed according to each respective barrier category. The years of teaching experience, means (M), standard deviations (SD), and number of personnel for each category is given in Table 5. From the results shown in Table 5, the data indicates there are no significant mean differences in the perceptions of electronics program faculty members categorized by years teaching experience toward each of the four perceived barrier categories to implementing multiple teaching strategies in a post-secondary electronics program. Furthermore, in Table 6, a nonsignificant F was obtained, thus satisfying the assumption of equality of group dispersions. To test for statistical significance of the difference between group centroids, Wilk's Lambda (λ) was performed, indicating an $F = 1.16$, $p = .31$. Therefore, not being able to detect any significant differences, this study failed to reject the null for the second hypothesis.

Table 5

Mean Univariate F's With Scores on Student, Resource, Classroom Environmental, and Teacher Training/Teaching Technology Barriers Categorized by Years Teaching Experience

Years	<u>Student</u>		<u>Resource</u>		<u>Classroom Env.</u>		<u>Teacher Trng/Teaching Tech.</u>		<u>n</u>	<u>F</u>	<u>P</u>
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>			
1-5	19.03	4.12	18.91	3.29	18.94	3.27	16.88	4.13	34	1.59	0.19
6-10	21.32	4.19	19.09	2.27	20.82	3.11	17.64	3.61	22	0.25	0.86
11-20	19.73	5.19	19.34	3.32	19.75	4.00	18.20	3.31	56	0.93	0.43
20+	20.84	4.19	18.82	3.18	20.68	4.58	17.82	3.66	38	1.63	0.19
Total									150		

*p < 0.05 Trng = Training Tech. = Technology Env = Environmental

Table 6

Univariate F's of Barrier Categories by Years of Experience

Source	df	F	η	p
Between groups				
Student	3	1.59	.032	0.19
Resource	3	0.25	.005	0.86
Classroom Env.	3	1.63	.032	0.19
Teacher Trng/Tching Tech	3	0.93	.019	0.43
SS within-group	146			

Barrier Analysis

Since the Likert Scale was utilized in the questionnaire with 1 representing strongly disagreed to 5 for strongly agreed, 3.5 was selected as the median value point for statements 1-29. Looking further into the means scores (\bar{x}) for each evaluation statement as to being a barrier/not a barrier, the following data was analyzed and identified:

Table 7

Barrier Analysis Means Scores (Median = 3.5)

Questionnaire Statement	Mean (\bar{x})	Barrier (yes/no)
1. Class size (number) is important when utilizing multiple teaching strategies.	4.4	yes
2. Learning disabled students are a barrier in using multiple teaching strategies.	2.8	no
3. Age of the students in my courses is a barrier to my use of multiple teaching strategies.	2.0	no
4. Joint partnership (team teaching) with other members of my department is a barrier in using multiple teaching strategies.	2.5	no
5. Educational partnerships with other technical and community colleges is a barrier in using multiple teaching strategies.	2.6	no
6. The quality of my teaching is important when utilizing multiple teaching strategies.	4.4	yes
7. Non-traditional students are a barrier in using multiple teaching strategies.	2.2	no
8. The corporate industrial sector in my area is a barrier in using multiple teaching strategies.	2.2	no
9. Courses in professional teacher development are important when using multiple teaching strategies.	3.8	yes
10. Social skills of my students are a barrier in using multiple teaching strategies.	2.7	no
11. Seating arrangement of my classroom is a barrier in using multiple teaching strategies.	2.6	no
12. Economic backgrounds of students are a barrier in using multiple teaching strategies.	2.4	no
13. Budgetary constraints are a barrier upon my utilization of multiple teaching strategies.	3.9	yes
14. Noise and distractions are a barrier in utilizing multiple teaching strategies.	3.7	yes
15. Cultural heritage of my students is a barrier in using multiple teaching strategies.	2.4	no
16. Climate (temperature) of my classroom is a barrier in using multiple teaching strategies.	3.2	no
17. My educational background prepared me well for using multiple teaching strategies.	3.6	yes
18. Accessibility of state-of-the-art classroom teaching equipment is a barrier in using multiple teaching strategies.	3.4	no
19. The quality of trained, professional instructional personnel (Part-time and Full-time) within my department is a barrier when using multiple teaching strategies.	2.7	no
20. Student discipline is a barrier in utilizing multiple teaching strategies.	3.2	no
21. Physically disabled students are a barrier in using multiple teaching strategies.	2.4	no
22. Amount of classroom time is important when utilizing multiple teaching strategies.	4.0	yes
23. Lighting in my classroom is a barrier in using multiple teaching strategies.	3.0	no
24. The design (construction) of my electronics laboratory or classroom is a barrier in utilizing multiple teaching strategies.	3.0	no
25. I am confident that I can effectively use all of the multiple teaching strategies in my classroom or laboratory.	3.6	yes
26. I understand when to use the appropriate teaching strategy which best achieves the desired learning outcomes.	3.9	yes
27. I believe that using multiple teaching strategies improves the learning process.	4.1	yes
28. My colleagues believe strongly that multiple teaching strategies should be used in electronics training programs.	3.5	no

29. The administration in my community or technical college has been philosophically supportive of multiple teaching strategies.	3.7	yes
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Table 8 below indicates the reliability of the independent variables (department chairpersons/faculty, faculty, and instructors) in comparison with the dependent perceived barrier variables (student, resource, classroom environmental, and teacher training/ teaching technology barriers).

Table 8

Reliability by Department Chairperson/Faculty, Faculty, and Instructor

Variables	D.C./Faculty	Faculty	Instructor	Questionnaire Items
Student	0.76	0.75	0.76	2,3,7,10,12,15,20,21
Resource	0.31	0.34	0.47	4,5,8,r22,13,18,r29
Classroom Env.	0.74	0.70	0.69	r1,11,14,16,23,24
Teacher Training/ r6,r9,r17,19,r25,r26,r27,r28 Teaching Technology	0.57	0.69	0.73	

Other additional data was provided with questionnaire item 30 and was stated as follows: “Are there other factors that are perceived as barriers to implementing multiple teaching strategies?” The responses given by the participants are indicated below in Tables 9-12. This researcher has attempted to classify these responses into one of the four perceived barrier categories (student, resources, classroom environmental, and teacher training/teaching technology). This has been accomplished in order to support and enhance the research of this project and to identify other “potential” barriers to utilizing multiple teaching strategies in a post-secondary electronics classroom.

Table 9

Additional Possible Student Barriers

1. Cultural
 2. Social Economic
 3. Family
 4. Student Commitment
 5. Student High School Preparation
 6. Student Family Support
 7. Unprepared Students
 8. Quantity of Students Rather Than Quality
 9. Student Background and Motor Skills
 10. Student Attitude and Ability
-

Table 10

Additional Possible Resource Barriers

1. Equipment
 2. Current Hardware
 3. Budget
 4. Training Material Computer Slide Manuals
 5. Lack of Distance Learning Technology in Electronics
 6. Service Manuals for Electronics
 7. Access to Industry-Reported Failures (Sony, General Electric, etc.)
 8. Money
 9. Time
 10. Time for Curriculum Development
 11. Bad Janitorial services
 12. Development Time
 13. Paperwork
 14. Lack of Funds
 15. Time to Implement
 16. Contact-Hour Base Funding
 17. Lack of Equipment
-

Table 11

Additional Possible Classroom Environmental Barriers

1. Forced to Teach at Off-Campus Location
 2. Heat or Air-Conditioning
 3. Class Size
-

Table 12

Additional Possible Teacher Training/Teaching Technology Barriers

1. Up-to-Date Equipment
 2. Equipment Set-Up
 3. Training for Part-Time Instructors
 4. Workload (Prep Time)
 5. Educational Background
 6. Instructor Sensitivity
 7. Instructor Training
 8. Work Overloads
 9. Incompetence
 10. Object to Change
 11. Instructor Commitment
 12. Release Time to Develop Materials
 13. Lack of Faculty Internships
 14. Lack of Preparation Time for Faculty
 15. Maximum 14 Hours for Department Chair
 16. Minimum 18 Hours/Maximum 24 Hours for Faculty
 17. Leaves Little Time for Preparation/Professional Development
-

Other possible barriers are reflected in another area that has been listed as “Miscellaneous”, whereby these responses indicate other unknown barriers outside the context of this research project. These additional concerns or interests have been identified by the population sample as warranting further consideration:

- Over-Stringent Classroom Policies
- Habit/Tradition
- Lack of Communication
- Purchase-Order Process

- Fear of Change
- No Process for Instructor Input to Administration
- Class-Time Length
- Stagnation
- Lack of Administrative Support
- Isolation/Location
- Poor Communication from System

Chapter 5 provides a summary of the study, a discussion of the significance of the findings, and recommendations for future research.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter summarizes the study and discusses the findings in an attempt to analyze and identify perceptual differences among department chairs, faculty, and instructors toward the barrier to using multiple teaching strategies in two-year technical and community college electronics courses. The implications of these perceptual differences in two-year technical and community college environments and recommendations for future studies are also discussed.

Summary of Findings

The purpose of this study was to analyze and identify perceptual differences among department chairs, faculty, and instructors toward the barrier to using multiple teaching strategies in two-year technical and community college electronics courses. A targeted population of 150 out of 231 electronics faculty members (65% response rate) was taken from two-year technical and community colleges across Texas.

The research instrument design was a 32-statement questionnaire using a Likert scale of 1 (Strongly Disagree) to 5 (Strongly Agree) involving electronics teaching faculty, instructors, and department chairpersons. A multivariate analysis of variance (MANOVA) was performed on four dependent variables: perceived student barriers, perceived resource barriers, perceived classroom environmental barriers, and perceived

teacher training/teaching technology barriers. The independent variables were department chairpersons/faculty, faculty, and instructors (both full-time and part-time) and years of teaching experience. The MANOVA was performed to control for Type I error rate and had power greater than .80. The statistical software package SPSS 10.1 was used to conduct the tests. Testing the assumption of the equality of group dispersions and statistical significance of the difference between group centroids was performed on each hypothesis.

The results of the Cronbach Alpha Reliability Coefficients (Table 2) were low primarily due to the small number of assessment questions and some inconsistencies among the participants indicating their choices. To better aid in the reliability and validity outcomes for future usage, it is recommended that further evaluation be given to each “statement construct” in the questionnaire (1-29) as to its intended communicative outcome and changes made to accommodate higher coefficients in these areas.

Discussion of Findings

The results of this study yielded non-significant statistical differences in four categories of perceived barriers (student, resource, classroom environmental, and teacher training/teaching technology) to implementing multiple teaching strategies in a post-secondary electronics program. The hypotheses are discussed as follows:

Ho1. There are no significant differences among the perceptions of department chairpersons, faculty, and instructors toward the four perceived barriers to implementing multiple teaching strategies in a post-secondary electronics program.

Although the data was not able to detect any significant differences and the null hypothesis was retained, the results provided knowledgeable information about the surveyed teaching community. The outcomes supported previous research by Theall and Franklin (1991), suggesting that conquering obstacles to reach skillful, effective teaching strategies does support student learning goals and promotes knowledgeable creativity. Furthermore, the participants revealed in their selection of choices that they were aware of these barriers, thereby supporting the University of Florida (1998) report, whereby awareness makes the teaching and learning process more meaningful and rewarding.

However, other findings refuted some of the earlier research mentioned in the literature review. For example, there were no significant conclusions or clear evidence from the results to support the research conducted by Lowman (1995), suggesting that the interpersonal dealings of students and instructors versus perception of the four barriers mentioned in this research study affects morale, motivation, and learning in the classroom. Additionally, there was no statistical significance substantiating the fact that adult learners were any more unique and diverse than traditional students, thereby refuting the conducted investigations by Hartnett (1972).

The findings obtained from this research may be explained by the limitations of the study. The targeted population was relatively small, because the study was limited to two-year community and technical colleges in Texas with only electronics programs. If additional department chairpersons, faculty, and instructors were included in the study from all occupational areas, the significance factor would have improved. What's more, a more thorough examination of the participants found that all had varied levels of

educational backgrounds, teaching experience, and teaching environments. This supports the research of Weimer (1990), who indicated that the spirit of exploration, adventure, and discovery rarely appears in classrooms because the conditions for training do not prescribe or enrich these teaching qualities. What's more, these inquiries support the studies conducted by Deegan and Tillery (1985), suggesting that colleges cannot produce the best students without teachers overcoming the barriers leading to success.

As stated in the literature review, the real challenge to the technical and community college system will come from the need for training a growing national population with high skill levels (Illinois Community College System, 1995). This, of course, will be no easy task at hand. Thus, a questionnaire instrument alone may not capture all the intricate barriers to utilizing multiple teaching strategies in a college classroom nor may it solve the teaching world's problems. However, researchers such as Kerka (1992) and Weinstein (1994) indicated that technical and community college educators must become "instrumental activists", overcome any barriers, and teach students how to learn and what to learn through other teaching paradigms.

Ho2. There are no significant differences in the perceptions of electronics faculty members categorized by years teaching experience toward each of the four perceived barrier categories to implementing multiple teaching strategies in a post-secondary electronics program.

Once again, the statistical data illustrated non-significant differences and the null hypothesis was retained in the perceptions of faculty members categorized by years of teaching experience toward each of the four perceived barrier categories to implementing

multiple teaching strategies. In fact, one noticeable result supporting the null hypothesis was the fact that 94 (63%) out of a total of 150 faculty and instructors had 10 or more years of experience compared to only 56 (37%) with less than 10, nearly doubling. Furthermore, another factor supporting the null hypothesis were the F and P variables (see Table 5) of the faculty and instructors with 1-5 years of experience and the 20+ years. These were, basically, in agreement with one another, suggesting that these two categories (the oldest and youngest compared with their teaching experience) of faculty and instructors perceive similar concepts, ideas, and strategies when using multiple teaching strategies. Thus, the small faculty and instructor variation with years of experience illustrates that the null hypothesis is true. Obviously, some instructors and faculty have more teaching experience than others, but, as Deegan and Tillery (1985) indicated in the literature review, technical and community colleges cannot produce the best students without qualified, professionally trained teachers.

Educational Importance of Findings

After examining the results of this study and the related literature review, it is becoming increasingly clear that the educational faculty of technical and community colleges appear to have similar attitudes and perceptions regarding teaching barriers mentioned in this research study. One trend from the findings that appeared often was the fact that the department chairpersons rated higher or lower in the means compared to their counterparts, the faculty and instructors. This tends to support the investigative studies of Paulsen and Feldman (1995), who indicated ways need to be found to “unfreeze” certain perceived attitudes and behaviors of teachers, thus allowing

improvement of their teaching capabilities. However, there is no clear evidence from the findings to validate and support the experimental study conducted by Robbins (1992), suggesting the threat to academic freedom looms high on the minds of educators, who perceive change as a threat to their survival.

Change can be difficult, to say the least. However, change is evident and must be accepted as a necessary iniquity. In her inquiries on faculty professionalism, Svinicki (1990) indicated the need for an instructional renaissance among educators to renew the life-long learning process and inspire a whole, new creative thinking process.

Recommendations for Future Research

Although this study has revealed informational data associated with the hypotheses found within this research project, it has introduced other inquiries in return. There are still additional barriers to consider when utilizing multiple teaching strategies that this investigation was unable to touch on (See Tables 9-12, pp. 46-47).

1. What impact upon the learning process do the additional barriers have compared to those mentioned in this research study when utilizing multiple teaching strategies in two year technical and community college electronics courses?

With this question in mind and being aware of the multitude of possible barriers, any future research should look into these areas of concern using a greater targeted population. Parnell (1990) stated that significant changes are expected in the type of futuristic work performed by the American labor market, requiring higher levels of problem solving, better reasoning abilities, increases in computer literacy, and most important of all—applying knowledge. These skills will require educators to overcome

teaching barriers, with the hope of allowing the utilization of more reliable teaching strategies in the classrooms.

However, it will be necessary to redefine, modify, and improve on existing questionnaire instruments in the hopes of gaining better reliability and validity. Today, our society and its residents are multicultural, multilingual, and multisensitive to the surrounding environment. People have, fundamentally, different instincts in the classroom (University of Indiana State, 1998). The socioeconomic and cultural patterns of students have changed over the past two decades, ushering in new teaching and learning demands (Brown, 1996). Developing a research instrument with these concepts in mind will pave the way for a better understanding of the learning/teaching process.

2. Is there really a significant difference in the learning outcomes of students when multiple teaching strategies are employed?

Although there has been much research in this area, each investigation concludes initially with one common factor—it depends upon the student. Lowman (1995) strongly states that all motivated students will perform best in any course and emerge as changed for the better. The American Psychological Association asserted “effective instruction focuses on the active involvement of students in their own learning...” (as cited in Halpern, 1994, p. 11).

However, McGrath & Spear (1991) argue that the colleges, themselves, tend to be unselfconscious about how their curricula and teaching strategies shape students. Accordingly, today’s students are being taught with yesterday’s teaching strategies. Therefore, diversity and variety in the utilization of teaching disciplines plays well in

shaping and molding today's post-secondary students.

Summary

If the United States is to remain a global competitor in the international community, our nation's two-year community and technical colleges must be able to provide graduates who are "second to none" in their respective fields. It has been said the quality of teaching is best evaluated not just simply in terms of what students learn but rather in terms of motivation so that students emerge changed for the better (Lowman, 1995).

Are perceived barriers to multiple teaching strategies preventing educational values from becoming "true to life"? What impact will perceived barriers to multiple teaching strategies have for students of the twenty-first century? The results, of course, may surprise us all!

APPENDIX A
SAMPLE LETTER OF INTRODUCTION
AND PERMISSION STATEMENT

Jerry E. Hutyra

413 N. Roberts
West, Texas 76691-1235

E-mail: jhutyra@tstc.edu

March 30, 2000

Dr. John Doe
President
ABC College
123 Anywhere Avenue
Anytown, Texas 00000

Dear Dr. Doe:

I am a graduate doctoral student at the University of North Texas in Denton. I am planning to conduct a questionnaire on barriers to utilizing multiple teaching strategies in two-year technical and community college electronics courses. This research will aid me in completing my doctoral dissertation. I plan to contact all two-year technical and community colleges throughout Texas, sending questionnaires to all electronics teaching faculty (both full-time and part-time).

Therefore, I am requesting your approval to conduct my research within your institution. You will notice at the bottom of this letter an area requiring your signature, granting me permission to conduct this research. After signing, please enclose this original signed letter within the self-addressed stamped envelope provided for your convenience. Please feel free to make a copy for your records.

If you are interested in the results of my questionnaire, please indicate by checking the appropriate area and enclose a self-addressed stamped envelope.

I greatly appreciate your assistance and help in this matter.

Sincerely,

Jerry E. Hutyra

PERMISSION TO CONDUCT RESEARCH

I, _____, do hereby grant Jerry E. Hutyra
(Signature and Title of Authorized Person)
permission to conduct doctoral research at _____.
(Official Name of Institution)

Send me the results. Enclosed is my self-addressed stamped envelope.

APPENDIX B

SAMPLE E-MAIL MESSAGE OF ALERT

REGARDING THE PERMISSION SLIP

Jerry E. Hutyra

1414 Chapel Creek
Waco, Texas 76712-8121

E-mail: jhutyra@tstc.edu

April 25, 2000

Dr. John Doe
President
ABC College
123 Anywhere Avenue
Anytown, Texas 00000

Dear Dr. Doe:

A few weeks ago, I submitted some information to your office (see attached letter) regarding my doctoral research entitled, "Analysis of Perceptual Differences Among Department Chairs, Faculty, and Instructors Toward the Barrier to Using Multiple Teaching Strategies in Two-Year Technical and Community College Electronics Courses".

As of this date, I have not received your reply. If you have already completed the permission approval form and returned it to me in the self-addressed stamped envelope, thanks very much for completing it.

If you have not completed the form, please use the one enclosed and return it to me at the address listed above. Your valued input is important to me and my doctoral research.

I greatly appreciate your assistance and help in this matter.

Sincerely,

Jerry E. Hutyra

APPENDIX C
SAMPLE E-MAIL MEMO OF ADDRESS
TO SCHOOL CONTACT PERSON

Hello! My name is Jerry Hutyra (pronounced who-terra) and I am a doctoral candidate/student at the University of North Texas (UNT) in Denton. A few weeks ago, I mailed a letter to the President of your institution requesting permission/approval to conduct an electronics-teaching questionnaire on teaching barriers as part of my dissertation project. Your President and the fine institution you represent have agreed to participate.

For this, I thank you!

However, in my initial letter, I failed to request some pertinent information needed to get my questionnaire underway. I am in need of a contact person (POC), including their e-mail address, phone number, and FAX.

Additionally, I am requesting the number of electronics teaching faculty (both part-time and full-time) within your school so that enough questionnaires can be mailed out! I would be very grateful in hearing from you about the information requested!

Nevertheless, if you are unaware of this project or my true intentions, please forward (to me) the name and e-mail address of your President so that I may contact him/her regarding this situation or give this memo to your school representative who may have been assigned as the POC! This would be a BIG help for me! This information is vital to the completion of my research project and my doctorate studies!

Your prompt attention and assistance in this matter will be greatly appreciated!

Sincerely as fellow educators,

Jerry E. Hutyra

APPENDIX D

SAMPLE E-MAIL MESSAGE REQUESTING
THE IMMEDIATE RETURN OF THE QUESTIONNAIRES

Good Morning! Recently, you may have received a special package from me containing questionnaire/assessment information and related data to be distributed to your faculty in accordance with our previous arrangements made a few weeks ago.

If you remember, my project is on Analysis of Perceptual Differences Among Department Chairs, Faculty, and Instructors Toward the Barrier to Using Multiple Teaching Strategies in Two-Year Technical and Community College Electronic Courses. This informational package is crucial and very important for the completion of my dissertation.

As of this date (April 1), I have not received your package and I am requesting your avid support and assistance in sending this information as soon as possible. Your active participation in this research project will greatly enhance the outcomes of the questionnaire.

If you have any questions or comments, please feel free to call me at (254) 867-2054, FAX (254) 867-3470, or e-mail at jhutyra@tstc.edu

Thank You!

Sincerely,

Jerry E. Hutyra

APPENDIX E
QUESTIONNAIRE

**Barriers to Utilizing Multiple Teaching Strategies In Two-Year
Technical and Community College Electronics Courses
Questionnaire**

Please rank the items below in terms of how strongly you feel each is a barrier to implementing multiple teaching strategies.

Bubble in only one response for each question.

SA = Strongly Agree, A = Agree, UN = Undecided, D = Disagree, SD = Strongly Disagree

Question	SA	A	UN	D	SD
1. Class size (number) is important when utilizing multiple teaching strategies.	0	0	0	0	0
2. Learning disabled students are a barrier in using multiple teaching strategies.	0	0	0	0	0
3. Age of the students in my courses is a barrier to my use of multiple teaching strategies.	0	0	0	0	0
4. Joint partnership (team teaching) with other members of my department is a barrier in using multiple teaching strategies.	0	0	0	0	0
5. Educational partnerships with other technical and community colleges is a barrier in using multiple teaching strategies.	0	0	0	0	0
6. The quality of my teaching is important when utilizing multiple teaching strategies.	0	0	0	0	0
7. Non-traditional students are a barrier in using multiple teaching strategies.	0	0	0	0	0
8. The corporate industrial sector in my area is a barrier in using multiple teaching strategies.	0	0	0	0	0
9. Courses in professional teacher development are important when using multiple teaching strategies.	0	0	0	0	0
10. Social skills of my students are a barrier in using multiple teaching strategies.	0	0	0	0	0
11. Seating arrangement of my classroom is a barrier in using multiple teaching strategies.	0	0	0	0	0
12. Economic backgrounds of students are a barrier in using multiple teaching strategies.	0	0	0	0	0
13. Budgetary constraints are a barrier upon my utilization of multiple teaching strategies.	0	0	0	0	0
14. Noise and distractions are a barrier in utilizing multiple teaching strategies.	0	0	0	0	0
15. Cultural heritage of my students is a barrier in using multiple teaching strategies.	0	0	0	0	0
16. Climate (temperature) of my classroom is a barrier in using multiple teaching strategies.	0	0	0	0	0

17. My educational background prepared me well for using multiple teaching strategies.	0	0	0	0	0
18. Accessibility of state-of-the-art classroom teaching equipment is a barrier in using multiple teaching strategies.	0	0	0	0	0
19. The quality of trained, professional instructional personnel (Part-time and Full-time) within my department is a barrier when using multiple teaching strategies.	0	0	0	0	0
20. Student discipline is a barrier in utilizing multiple teaching strategies.	0	0	0	0	0
21. Physically disabled students are a barrier in using multiple teaching strategies.	0	0	0	0	0
22. Amount of classroom time is important when utilizing multiple teaching strategies.	0	0	0	0	0
23. Lighting in my classroom is a barrier in using multiple teaching strategies.	0	0	0	0	0
24. The design (construction) of my electronics laboratory or classroom is a barrier in utilizing multiple teaching strategies.	0	0	0	0	0
25. I am confident that I can effectively use all of the multiple teaching strategies in my classroom or laboratory.	0	0	0	0	0
26. I understand when to use the appropriate teaching strategy which best achieves the desired learning outcome.	0	0	0	0	0
27. I believe that using multiple teaching strategies improves the learning process.	0	0	0	0	0
28. My colleagues believe strongly that multiple teaching strategies should be used in electronics training programs.	0	0	0	0	0
29. The administration in my community or technical college has been philosophically supportive of multiple teaching strategies.	0	0	0	0	0
30. Are there other factors that are perceived as barriers to implementing multiple teaching strategies?	0	0	0	0	0

a. _____ b. _____ c. _____ d. _____

Background Information

31. Please indicate in which category you are employed and your Full-time/Part-time status.

Department/Program Chair and Faculty Member Faculty Instructor Other

Full Time
Part Time

32. How many years have you worked in education? (Count all institutions)

One to five years

Six to ten years

Eleven to twenty
years

More than twenty years

APPENDIX F

SAMPLE LETTER OF EXPLANATION

ABOUT THE QUESTIONNAIRE

Date:

Dear Electronics Professional:

I am an employee at Texas State Technical College Waco/Palacios (Waco campus) and a doctoral candidate at the University of North Texas. ***I am conducting a questionnaire on barriers to utilizing multiple teaching strategies in two-year technical and community college electronics courses.*** This study is sent to you as part of my dissertation project in determining the extent that these barriers play in preventing the use of multiple teaching strategies. I am sending this poll to each two-year technical and community college electronics teacher who instructs students on either a part time/full time basis.

The results of this research study will be provided (without the use of names) to each participating campus to aid in better understanding the classroom restrictions placed upon teachers while conducting instructional electronics training. ***Your assistance will greatly enhance the success of this project and the completion of my doctorate studies.*** Attached is a 32-item questionnaire that will take approximately 10-15 minutes to complete. As a full-time faculty member of Texas State Technical College in Waco, please accept this school coaster as a token of my appreciation for participating in this assessment.

Your participation in this study is strictly voluntary-you may withdraw at anytime without penalty, prejudice, or loss of benefit.

Please do not sign your name to the questionnaire. Each questionnaire is coded for the purposes of research and will, in no way, reveal the identity of any individual. All evaluation and assessment information will be kept confidential.

This is a one-time request for information; upon completion of this questionnaire, no additional feedback forms will follow.

*******Instructions for completing the questionnaire:**

(1) Complete the evaluation. Answer all items to the best of your knowledge.

(2) Place the questionnaire in the envelope provided and seal it.

Give the envelope to your assigned point of contact person, who, in turn, will forward it to me.

There is no personal risk for responding to this research because neither your name nor your department can or will be included with the information collected or reported. Please address any questions to me at jhutyra@tstc.edu or call (254) 867-2054. Thank you for your time and support.

Sincerely,

Jerry E. Hutyra

**This project has been reviewed and approved by the University of North Texas
Committee for the Protection of Human Subjects (940) 565-3940.**

APPENDIX G
DEFINITIONS ATTACHED
TO EACH QUESTIONNAIRE

Definitions to aid in completing this questionnaire.

Please use these definitions in completing your questionnaire.

1. **Barriers.** For this questionnaire, obstacles, factors, or detours that have the tendency to impede or stop the flow of new information and knowledge.
2. **Cultural heritage.** For this questionnaire, customary beliefs, social forms, and material traits of a racial, religious, or social group as a result of one's natural situation or birth.
3. **Demographic.** For this questionnaire, relating to the dynamic balance of a population of people especially with regard to density and capacity for expansion and decline.
4. **Multiple teaching strategies.** Instructional tactics and activities used by teachers, instructors, and other training personnel for helping learners progress from where they are to where they must be.
5. **Non-traditional students.** For this questionnaire, individuals who are classified as single parents, displaced workers, or older adults.
6. **Social skills.** For this questionnaire, exhibiting talents that indicate a conscious tendency to form cooperative and interdependent relationships with one's fellows.

APPENDIX H

SAMPLE LETTER OF VOLUNTARY PARTICIPATION

Minimal Risk Potential

I, _____, agree to participate in a study of individuals involved in assessing barriers preventing the use of multiple teaching strategies at the University of North Texas in Denton, Texas. The purpose of this study is to analyze and identify perceptual differences among department chairs, faculty, and instructors toward the barrier to using multiple teaching strategies in two-year technical and community college electronic courses.

As a participant, I understand that my involvement in this research study is strictly voluntary and will take only 15-20 minutes of my time to complete the questionnaire.

I have been informed that any information obtained in this study will be recorded with a code number that will allow Mr. Jerry E. Hutyra to determine my identity. At the conclusion of this study, the key that relates my name with my assigned code number will be destroyed. Under this condition, I agree that any information obtained from this research may be used in any way thought best for publication or education.

I understand that there is no personal risk or discomfort directly involved with this research and that I am free to withdraw my consent and discontinue participation in this study at any time.

If I have any questions or problems that arise in connection with my participation in this study, I should contact Mr. Jerry E. Hutyra, the project director, at (254) 867-2054 (work) or (254) 420-3293 (home).

(Date)

(Signature of Participant)

(Date)

(Signature of Investigator)

This project has been reviewed by the University of North Texas Committee for the Protection of Human Subjects (Phone: 940-565-3940).

APPENDIX I
SAMPLE LETTER OF INFORMATION ON
TABULATION OF THE RESULTS

Jerry E. Hutyra

308 Keesler Lane
Waco, Texas 76705-1519

E-mail: Jerry.Hutyra@tstc.edu

December 13, 2000

Dr. John Doe
President
ABC College
123 Anywhere Avenue
Anytown, Texas 00000

Dear Dr. Doe:

Several months ago, you and your school participated in a questionnaire that I conducted as a dissertation project for my doctorate degree. After many painstaking weeks, I have processed and analyzed the responses given by the respondents to the questionnaire.

I am pleased and happy to forward these results to you, since you indicated with a self-addressed stamped envelope, that you wish to receive the outcomes.

I am grateful to you and your school for actively participating in my dissertation project.

Merry Christmas and Happy New Year!

Sincerely,

Jerry E. Hutyra

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