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ABSTRACT
        Texas Schools, Inc. (TSI) developed a pilot program
in bilingual education for Mexican-American vocational workers in the
Department of Diesel Mechanics at Texas Tech University. This study
assesses the transfer of technology in that environment using
quantitative and qualitative measures. TSI, a technical and
vocational school in Lubbock, Texas, operated from 1972 to 1992. The
pilot bilingual effort consisted of a 6-month technical training and
language development program. During the first 3 months technical
classes were conducted in Spanish; during the last 3 months, in
English. Spanish and English language classes were taught throughout
the program. A total of 16 students were studied using the Canadian
International Development Agency (CIDA) scale and case study
interviews. The student questionnaire consisted of five questions
dealing with the differences between the students' educational
experiences in Mexico and in America; the instructor questionnaire
addressed student differences and changes that could improve the
educational climate at TSI. Results suggest: (1) students preferred a
group approach to learning and a preference for laboratory practice,
and looked to the instructor as a caretaker as well as instructor;
(2) the teacher's agenda favored classroom instruction over
laboratory instruction; (3) the norms, roles, agendas, and motives of
the students and instructor came into conflict in their attempt to
transfer technology successfully; (4) technology transfer did take
place; and (5) CIDA scales are useful instruments for studying the
transfer of technology whether the change agents are from the host or
visiting culture. Contains 31 references. (LB)

Texas Schools, Inc.: A Case Study

of the Transfer of Technolgy

at a Pilot Bilingual Program

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Abstract

Texas Schools, Inc. developed a pilot program in bilingual education for Mexican-American vocational workers in the Department of Diesel Mechanics. This study assesses the transfer of technology in this environment using quantitative and qualitative measures.

Nine students in Group A had completed their first three months of training. The seven students in Group B had just begun training. For the Canadian International Development Agency (CIDA) scale scores (Hawes & Kealey, 1979) on Ability (A-G Scale), there was no significant overall difference between A and B (t=-1.45, df 11, p<.05); for the expectations (A-C Scale), B reported more positive expectations than A (t=-3.63, df=12, p<.05); for the feelings (A-D Scale), A reported more positive feelings than B (t-5.16, df=14, p<.05). In both the written theory and laboratory skills, B performed better than A. In a complex relationships, feelings and expectations of success were strong predictors of success.

Interview questions indicated that the norms, roles, agendas, and motives (Johnson, 1984) conflicted in the attempt to transfer technology. However, this conflict was ameliorated by a positive climate

including admiration and respect. This positive
climate interacts with and informs the understanding of
A's expectations. Respect for the instructor grows
along with the realization of difficulty in teaching
and in studying.

The triangulation in this study suggests that CIDA
scales are useful instruments for studying the transfer
of technology whether the change agents are from the
host or visiting culture. This triangulation also
suggests important ways that intercultural training
must be developed in the vocational setting.

Introduction

Background

Nationally, the high school completion rate for
persons 25 years or older in the general population is
76%; however, for Hispanics, the completion rate drops
to 51.8%. For Hispanics of Mexican origin, the rate
drops even lower--to 44.4%, whereas 63.4% of Hispanics
of other than Mexican origin complete high school
(Bureau of the Census, 1987). Concurrently, 32.4% of
the Hispanics in the workforce are in low-income jobs,
while only 19.4% of Hispanics hold technical, sales,
and administrative positions. Only 7.8% of management
positions are held by Hispanics (Bureau of the Census,
1983). This population, then, is clearly under
represented in education and skilled labor.

In response to this situation, Texas Schools, Inc.
(TSI) initiated a pilot bilingual program that
endeavored to recruit Mexican and Mexican-American
students for vocational and technical training. Texas
Schools, Inc. was a technical and vocational school in
Lubbock, Texas. The school operated from June, 1972,
until its closing on February, 13, 1992. It was
licensed and regulated by the Texas Education Agency,

Division of Proprietary Schools and Veterans Education.
Accreditation came from the Southern Association of
Colleges and Schools (Texas Schools, Inc., General
Catalog, 1992). Coursework included: diesel
mechanics, welding, vocational automotive,
refrigeration/heating/air conditioning, collision
repair, and electronic maintenance technology; business
and medical programs had been added to the curriculum,
but instruction had not begun.

At the time of its closing, TSI operated with
forty employees. Administrative staff, admissions and
financial aid, and support staff consisted of eighteen
employees. The faculty consisted of twenty-two part-
time and full-time instructors.

In May, 1991, As part of its recruiting efforts,
TSI contacted the Bilingual/Multicultural Education
Resources Center (BMERC) in the College of Education at
Texas Tech University for assistance with their
incoming limited English-proficient students. By July,
1991, the BMERC was in position as consultant for TSI
in instituting the bilingual technical training program
for the Diesel Mechanics Technology Department.

This pilot bilingual program was housed in the Diesel Mechanics Technology Department. Instruction in this program included technical training and language development. The course of instruction was based on a six-month technical training program. During the first three months technical classes were conducted in Spanish. Classes during the final three months were conducted in English. English and Spanish language classes were taught throughout the six-month period.

The first class of bilingual students began their program in June, 1991, and graduated in January, 1992. The second class began in October, 1991, and the third and final class began in January, 1992. The purpose of this paper is to explore the effectiveness of this pilot bilingual program.

Theoretical Perspective

The theoretical perspectives of intercultural training and intercultural competence provide useful information on training programs. However, the perspective used in this paper is the transfer of technology. This theory describes the mechanisms by which information is imparted across cultural boundaries.

Transfer of technology theory addresses the process of teaching and learning as it takes place between persons from different cultures. Hawes and Kealey (1979) define the actual transfer of technology as the capacity to transfer job skills. They go on to note that four personal factors contribute to the successful transfer of technology: professional qualifications, interpersonal skills, self assertion/identity, and realistic pre-departure expectations (p. 179).

Professional qualifications for this transfer of technology include commitment to the job, and technical background and skills. The interpersonal skills needed are flexibility, respect, listening skills, relationship building, calm and self-control, and sensitivity to culture. Self assertion/identity includes initiative, confidence, and frankness. Realistic pre-departure expectations are defined as a balance between recognition of the constraints of working in a foreign culture and optimism about success in the foreign culture (Hawes & Kealey, 1979).

This transfer of technology is a sharing that takes place between cultures, whether geographic or

organizatioal, as in the case of TSI. This process of

sharing develops a third culture. Third culture is

defined as "the behavior patterns created, shared, and

learned by men of different societies who are in the

process of relating their societies, or sections

thereof, to each other" (Useem, Donoghue, & Useem,

1963, p. 169). Third culture building, then, occurs

when two different cultures attempt to negotiate the

ways in which they will interact together (Metzger,

1987). Knapp (1984, ch. 2) argues that this third

culture develops whenever any two people interact. For

example, as the instructor and students at TSI

interacted, a third culture was developing.

The third culture (both geographic and

organizational) that emerges in the transfer of

technology can be explicated through an analysis of

organizational culture. Johnson (1984) argues that

communication is the process of organizing. Further,

"organizing is a continual process by which

relationships are accomplished" (p. 2). Specifically,

she notes that communication creates the elements of

culture, which are norms, roles, agenda, and motives

(Johnson, 1981).

In order for the transfer of technology to take place at TSI, a third culture had to be negotiated between the Mexican students and the Mexican-American and Euro-American instructors. Norms, roles, agenda, and motives apply to the study of the bilingual program at TSI because they directly address the success or failure of the transfer of technology in the course of the training program.

A norm is expected behavior. Norms exist in educational and training settings as in any other setting. If students and instructors are made aware of the ways in which each expects the other to behave, the training process will be simplified.

A role is the part one plays in a particular situation. The role of students is that of learner, while the role of instructors is that of teacher. However, the ways in which these roles are expressed and carried out would be expected to vary from culture to culture.

An agenda is the order in which events are expected to occur. Educational agenda would also be expected to vary from culture to culture.

Finally, motives are the reasons for behavior. Understanding the motives of students will assist instructors in making any needed adjustments to teaching strategies.

Importance of this Project

The purpose of this study was to discover the strengths and weaknesses of the bilingual curricula developed by the BMERC for the Diesel Mechanics Technology program at TSI. In developing this project, two research questions were considered:

RQ$_1$: Do the personal expectations and interpersonal experiences that classically define the transfer of technology influence the transfer of technology at TSI?

RQ$_2$: How does the third culture at TSI influence the transfer of technology?

Analysis of Quantitative Study

Methods

Subjects

The respondents in the quantitative portion of this study were instructors and bilingual students in the Diesel Mechanics Department at TSI. The Diesel

Mechanics Department employed one bilingual instructor

and one monolingual (English-speaking) instructor. The

department also employed ESL and night class bilingual

instructors, but they were not involved in this study.

Also, the pilot group of students, who had already

graduated, were not involved in this study.

The bilingual students in the day classes

consisted of two groups. The first group (Group A)

included nine students who began their study in the

second wave of the program and moved from tne initial

three months of technical classes taught in Spanish to

the secondary three months of technical classes taught

in English.

The second group (Group B) included seven students

who began their study in the third wave of the program

and completed only three weeks of classes before the

school was closed. Both groups of students received

ESL training as part of their overall program at TSI.

The instructors were males in their mid-thirties.

All the students were males ranging in age from 17 to

40 years, except one student, who was over 50 years

old. The average age of the students was 26 years.

All of the students were from Northern Mexico or from

Texas close to the border with Mexico. Spanish was
their maternal language, and each was classified as
having varying degrees of limited English proficiency.

All of the diesel mechanics students who were
currently enrolled in the day classes, except one
absentee, participated in this portion of the study.
The students completed the CIDA instruments, and scores
from their written theory and laboratory skills tests
were obtained. Participants in the study received no
payment for their participation. This study was
approved by the Human Subjects Committee of Texas Tech
University.

Instruments

The quantitative data for this study included the
written theory and laboratory skills exam scores of the
students, and an instrument that was developed by the
Canadian International Development Agency (CIDA) to
identify the components of overseas effectiveness and
formulate a profile of effectiveness, based on an
individual's characteristics (Hawes & Kealey, 1979).
Three scales were extracted from the CIDA instrument:
the Self-Ratings (A-G Scale), Personal Expectations (A-
C Scale), and Personal Feelings (A-D Scale).

For this study, the wording of these scales was adapted to parallel more closely the population at TSI (Appendix A). For instance, when the CIDA measure referred to " he other culture," the current questionnaire referred to "the American culture."

Procedures

Both Group A and Group B completed the CIDA instruments during separate one-hour sessions. For each of the two sessions, the students were assembled in a classroom. The instruments were passed out to the students, and the bilingual instructor explained in Spanish and in English that the instruments were part of a study being conducted by Texas Tech University for the purpose of improving the bilingual training program. The instructor then explained the procedure for completing the instruments and left the room. The researcher remained to monitor the students and to answer procedural questions. Since English proficiency varied widely among the students, the more fluent students assisted the others with problems of translation.

Results

Research question 1 concerned the correlation between expectations and experiences, and the transfer of technology. For this study, the CIDA instrument was used to measure ability, expectations, and feelings; and test scores from written theory exams and laboratory skills exams were used to measure the transfer of technology.

Preliminary Analysis

Ability (A-G) Scale. Cronbach's alpha for the Ability (A-G) Scale of the CIDA instrument was originally .74. Reliability was improved to .81 by d..opping Item 1 of this scale, Interaction with Americans. The intercorrelations among the remaining items of the ability scale are displayed in Table 1, Appendix A.

Expectations (A-C) Scale. Cronbach's alpha for the Expectations (A-C) Scale was originally .74. Dropping Item 4, Expectation to do Well in this Program, improved reliability to .81. The intercorrelations among the remaining items of the expectation scale are displayed in Table 2, Appendix A.

Feelings (A-D) Scale. Cronbach's alpha for the
Feelings (A-D) Scale was originally .76. Item 5,
Feelings about Speaking Another Language, was dropped,
increasing reliability to .83. The intercorrelations
among the remaining items of the feelings scale are
displayed in Table 3, Appendix A.

Between-Group Differences

To test for differences between the two groups of
students, (those mid-way through the program, Group A,
and those just beginning the program, Group B), t-tests
were performed for each of the three CIDA scales, and
item-by-item for each scale. Also, t-tests were
performed for differences between the two groups on the
written theory and laboratory skills exam scores.
Notable throughout these comparisons is the lack of
deviations within the Group B scores. This may
indicate that individuals in this group may have had no
referent for answering the questions on the feelings
scale. Thus, the obtained differences may have been
spurious. Conversely, the lack of referents for
responding to the items could indicate true differences
between the two groups of students.

Ability (A-G) Scale. There was no significant difference overall (t=-1.45, df=11, p>.05) between Group A (M=32.0, SD=6.91) and Group B (M=36.8, SD=3.03). For Item 6, Accepting American Customs, Group B (M=4.8, SD=.45) had slightly more positive feelings (t=3.21, df=12, p<.05) than did Group A (M=3.77, SD=.71). For Item 8, Appropriate Background, Group B (M=4.6, SD=.55) reported a higher instance (t=-2.29, df=11, p<.05) than did Group A (M=3.13, SD=.48).

Expectations (A-C) Scale. For the Expectations Scale overall, Group B (M=13.8, SD=1.1) reported much more positive expectations (t=-3.63, df=12, p<.05) than did Group A (M=7.22, SD=3.9). For Item 2, Preparation Time, Group B (M=4.4, SD=.89) felt more positive (t=-3.41, df=12, p<.05) than did Group A (M=1.78, SD=1.6). For Item 3, Trouble Interacting, Group A (M=2.0, SD=1.6) had lower expectations of trouble (t=-3.5, df=12, p<.05) than did Group B (M=4.6, SD=.55).

Feelings (A-D) Scale. Overall for the Feelings Scale, Group A (M=13.6, SD=3.24) reported more positive feelings (t=5.16, df=14, p<.05) than Group B (M=7.14, SD=.38).

For Item 1, Work with English Speaking Instructors, Group A (M=2.3, SD=8.7) reported more positive feelings (t=4.04, df=14, p<.05) than did Group B (M=1.00, SD=0). For Item 2, Work with Spanish Speaking Instructors, Group A (M=1.67, SD=5.0) had slightly more positive feelings (t=3.5, df=14, p<.05) than did Group B (M=1.0, SD=0). For Item 3, Work with Classmates, Group A (M=1.44, SD=5.27) had more positive feelings (t=2.21, df=14, p<.05) than Group B (M=1.0, SD-0). For Item 4, Getting to Know Americans, Group A (M=1.89, SD=6) had more positive feelings (t=3.88, df=14, p<.05) than Group B (M=1.0, SD=0). For Item 6, Learning New Customs, Group A (M=2.22, SD=9.71) had more positive feelings (t=3.30, df=14, p<.05) than Group B (M=1.0, SD=0). Finally, for Item 7, Interacting with Americans, Group A (M=1.89, SD=9.28) had more positive feelings (t=2.51, df=14, p<.05) than Group B (M=1.0, SD=0).

Exam Scores. In both the written theory and laboratory skills exams Group B performed better than Group A. Written theory exam scores for Group B (M=91, SD=7.7) were considerably higher (t=-4.8, df=11, p<.05) than for Group A (M=67.9, SD=8.9). Laboratory skills

exam scores for Group B (M=95, SD=0) were also
considerably higher (t=-4.04, df=11, p<.05) than Group
A (M=83.28, SD=7.06).

Discussion

CIDA Scales

Correlation coefficients for the five variables of
interest to RQ_1 are displayed in Table 4, Appendix A.
The results of this study suggested that the more one
engaged in interpersonal interactions the greater was
one's perceived ability to function within a foreign
culture. As Hawes and Kealey (1979) pointed out,
interpersonal skills are one of the four requisites for
successful transfer of technology.

Second, the higher were one's expectations for
success, the fewer concerns he or she felt about
performing in a foreign culture. This corresponds with
Hawes and Kealey's (1979) assertion that positive but
realistic expectations of success are necessary for the
successful transfer of technology.

Finally, the more positively one felt about
engaging in interactions, the more positively one felt
about performing in a foreign culture. Again,

interpersonal skills are necessary for the successful
transfer of technology.

As explained earlier, the CIDA instrument was used
in this study to determine predictors of success within
a foreign culture. Written theory and laboratory
skills exam scores were used to determine the extent to
which the transfer of technology had been successful.
As might be expected, written theory exam scores and
laboratory skills exam scores were closely related to
each other. The factors from the CIDA scales that
were related to laboratory and written theory exam
scores were expectations and feelings. Expectations
were positively correlated with success as defined by
high exam scores, but negatively correlated with
success as defined by the amount of the program
completed. Feelings were negatively correlated with
success as defined by high exam scores, but positively
correlated with success as defined by the amount of the
program completed.

Since the factors of the feelings scale are
indicators of interpersonal skills, this agreed with
Hawes and Kealey's (1979) contention that interpersonal

skills and positive but realistic expectations are necessary for success.

Exam Scores

In this study, Group B performed better on both written theory and laboratory skills exams. Written theory exam scores were particularly higher for Group B than for Group A.

Results from this study suggest several differences between Groups A and B. First, Group B's higher scores on the ability and expectations scale may be linked to actual experience. Since Group A had been participating in the program at TSI three months longer than had Group B, Group A's scores may reflect a more realistic response than Group B's scores. Also, Group B's superior performance on exams may be connected to the level of difficulty of the material. Again, since Group A had been enrolled in the program three months longer than Group B, the material covered by Group A would be more advanced and difficult than the material covered by Group B.

Analysis of Case Study

Methods

Subjects

The subjects in the case study portion of the study were also members of the Diesel Mechanics Department at Texas Schools, Inc. (TSI). Four students and one instructor were interviewed. By request of the lead instructor, the students who participated were the students with the highest and lowest scores in their class. The lead instructor also requested that four students from the older more experienced group, Group A, be interviewed, instead of only two--the two with the highest scores and the two with the lowest scores-- as well as the highest and lowest students from the younger less experienced group, Group B.

Instruments

The case study portion of the study was a series of interview questions devised to answer the second research question. The questions were used to determine the perceived differences between American education procedures and Mexican education procedures, and how the learning experience of Mexicans in the United States can be strengthened (Appendix C).

Procedures

Interviews were conducted anonymously; no identifying information about subjects was given. Each interview consisted of one thirty or forty minute session. Interviews were conducted one-on-one between the interviewer and interviewee, except that the help of a translator was necessary in interviewing students who primarily speak Spanish and whose English-speaking abilities were, as yet, limited. The translator was a member of the BMERC staff working at TSI.

Students were admitted to the interview room individually. The translator explained to each one that the information they gave would be completely confidential and that it would be reported without any identifying details.

Results

Students

The student questionnaire consisted of five questions dealing with the differences between the students' educational experiences in Mexico and their educational experiences in America. The final question asked what changes could be made at TSI that would improve the program. In the following paragraphs,

"Students 1" refers to the students with the highest
scores; "Students 2" refers to the students with the
lowest scores.

Question 1 was, "When you first started at TSI,
are there things that your American instructors at TSI
did that were different from what your instructors did
in Mexico? Explain."

Students 1 responded only that, of course, the
language was different--their American instructors
spoke English and their Mexican instructors spoke
Spanish. Students 2 responded that American
instructors spent less time covering the material than
did Mexican instructors.

Question 2 was, "When you first started at TSI,
are there things that your Mexican-American instructors
at TSI did that were different from what your
instructors did in Mexico? Explain."

Students 1 again noted language differences, this
time in dialect. The Mexican-American instructor spoke
"Tex-Mex" (the local dialect) instead of the Mexican
dialect the students speak in Northern Mexico. They
reported that their rapport with the Mexican-American
instructor was such that they could joke with him about

this and correct his "bad Spanish." Students 2
responded that the Mexican-American instructor covered
the classroom material (theory) fewer times and in less
detail than did their Mexican instructors.

Question 3 was, "Are there some things you wish
your American instructors at TSI did differently?
Explain."

Students 1 felt that the program needed more
instructors and at least one laboratory assistant.
Students 2 also felt that all instructors should be
bilingual and speak at least a little Spanish, and that
the instructors should pay equal attention to everyone
(this answer is clarified in answers to question 4
regarding the problems arising out of the arrival of
the third wave of students, Group B).

Question 4 was, "Are there things you wish your
Mexican-American instructors at TSI did differently?
Explain."

Students 1 stated that the program needed more
instructors. They also expressed great appreciation
for the Mexican-American instructor, but felt that he
had too many responsibilities to give adequate
attention to his teaching duties. They also said that

since the new class had arrived, the instructor had
spent most of his time teaching Group B, which meant
that Group A was not receiving enough attention and
instruction.

Students 2 were concerned with three staffing
problems and one problem with materials. The three
staffing problems were: (1) the need for more
instructors, (2) the need for separate classes for
Group B, and (3) the need to treat everyone equally
(give equal attention to Group A students and Group B
students, instead of spending more time with Group B
than with Group A). The concern with materials was in
regard to the use of charts picturing diesel parts and
troubleshooting techniques for each, an instructional
method used in Mexico but not at TSI.

Question 5 was, "What could TSI do to better meet
your educational needs?"

The high students' responses could be grouped into
three categories: language, laboratory, and staffing.
The final category was a restatement of the need for
more instructors. The low students' responses could be
grouped into four categories: language, laboratory,
staffing, and time.

Students 1's concerns were as follows. The language category had three points. First, that their initial text was in English. Since the first three months of their technical instruction was to have been in Spanish, this was a definite drawback. Second, that they were later provided with a Spanish edition of the same text, but that this edition was significantly less detailed than the English edition. Finally, that the exams were written in English. The students were allowed to answer in Spanish, but they pointed out that some of the technical terms were different in Spanish.

The laboratory category had five points. First, that there were too few components for the students to work on, and that, second, the components that were available all had missing parts. Third, there were so few components for so many students that organization was a problem, and the components and parts got scattered around the lab. Fourth, that the testing equipment was out of calibration, so that even when they were able to repair engine components they were not able to test their results. Finally, that the time they were able to spend in the laboratory was inadequate.

The two low students' concerns were as follows.
The language category concerned ESL training. They
felt that the method being used was inadequate--that
they were not learning enough English.

The laboratory category had three points. Like
the highest students, they felt that (a) there were not
enough components available, (b) the components
available all had missing points, and (c) there was no
organization because too many people were trying to
work with too few components. The staffing category
was again a restatement of the need for more
instructors.

Finally, the time category had two points. First,
that six months (which is the length of the technical
courses at TSI) was inadequate to learn all the
material they needed to learn to be prepared for the
job market. Second, that the administration was
continually calling them out of class to take care of
paperwork. Since this involved a one-hour round trip
walk to the main campus, they regretted the lost
instructional time.

Instructor

The instructor questionnaire consisted of three
questions addressing the differences between American
students and Mexican students, and changes that could
be made that would improve the educational climate at
TSI. Question 1 was, "When the bilingual students
first started at TSI, were there some things they did
differently from American students? Explain."

The answers to the first question concerned
question-asking behaviors, and had three parts. First,
the Mexican students were always in a "bunch"
discussing what went on in the classroom and helping
the slower students understand the lesson; American
students went off on their own. Second, Mexican
students were more hesitant to ask questions than
American students. They would form groups, discuss the
question in the group, and then, if no one in the group
knew the answer, they would choose a spokesperson who
would ask the question of the instructor. Usually, the
group would hang back, and only the spokesperson would
approach the instructor. However, if the question were
pressing or urgent, the whole group would approach.
The instructor speculated that this gave the

spokesperson more speaking power. Finally, when
questions were asked one-on-one, they were generally
posed after class, not during class.

Question 2 was, "Are there some things you wish
your bilingual students did differently? Explain."

The instructor responded that he wished the
students had "been more open as far as telling him
their actual thoughts." The students would "hold back"
when he asked a question. He suggested that this was
because the student being asked to answer was fearful
that everyone except him knew the right answer, and he
would give the wrong answer.

Question 3 was, "Are there some things the
bilingual students could do to improve the educational
climate? Explain."

The answer to Question 3 had two parts. First,
that the students could have been more open to making
suggestions. Second, that they could have shown more
willingness to accept new concepts from people other
than this instructor.

The instructor's responses to the questionnaire
were chiefly concerned with behaviors. To Question 1,
he responded with comments about question-asking

behaviors. To Question 2, he responded with remarks
about question-answering behaviors. Finally, to
Question 3, he responded with observations about
loyalty behaviors.

Comparison between Students and Instructor

Student responses to the questionnaire focused on
abstracts. They concerned language differences,
problems in the laboratory, amount of time for
instruction, and staff shortages. As noted, the
instructor's responses focused on three sets of
behaviors: question-asking behaviors, question-
answering behaviors, and loyalty behaviors.

Discussion

The case study portion of this study was designed
to answer the second research question: how third
culture influences the transfer of technology,
especially how norms, roles, agendas, and motives
develop that either enhance or impede the transfer of
technology.

The Mexican students' norms can be seen in their
question-asking and question-answering behaviors.
According to the instructor, the students would "bunch

up" in groups and discuss items from his lecture that they did not understand. Speaking up in class or coming directly to him were not the norm. Their reticence was also apparent in their reluctance to answer questions in class.

The students' expectations of roles in this study were three-part. First, were the obvious learner and teacher roles. Second, were the roles played by quicker and slower students. According to the instructor, the students discussed their questions among themselves. In this group, the quicker students took on the role of teacher, while the slower students kept the role of learner. Finally, one person from the group was chosen to fill the role of speaker for the group.

The students' agenda showed preference to laboratory practice. They apparently wished to spend more time in practicing diesel engine maintenance than in learning diesel engine theory.

Motives for the students were related to the achievement of their educational goals. Their desire for more instruction time, more laboratory time and equipment, and more attention from the instructor were

motivated by their desire to learn enough about diesel mechanics to enable them to apply their knowledge in the workforce.

Norms for the instructor were apparent in two areas. First, extensive one-on-one instruction was not a norm. Students were expected to pick up most of the technical information from lectures. Second, the instructor expected the students to be more willing to ask and answer questions in class than they were. Reticence was not a norm for the instructor.

The role played by the instructor surpassed that of teacher. As the instructor stated, the students refused to accept new concepts from anyone except him because they thought he would give them more attention. This indicates that, to the students, he took on the role of caretaker as well as teacher.

The instructor's agenda favored classroom instruction over laboratory instruction. More time was spent in theory and language development than in laboratory practice.

The instructor's agenda suggests that he was motivated by a desire to insure that his students understood the theory behind the workings of the diesel

engine. Spending more time in the classroom as opposed
to spending more time in the laboratory emphasizes the
learning of theory over skills practice.

The norms, roles, agendas, and motives of the
students and instructor came into conflict in their
attempt to successfully transfer technology. This was
indicated by their apparent frustration in responding
to the interview. The students chose to follow the
norm of group discussion; the instructor wanted the
students to adhere to the norm of speaking up in class
instead. The students wanted the instructor to assume
the role of caretaker, while the instructor wished
instead to completely fulfill his role of teacher. The
students' agenda favored practice over lecture, while
the instructor's agenda was the opposite. Finally, the
students were motivated by the desire to learn
practical application of diesel engine theory by
working in the laboratory, whereas the instructor was
motivated by the desire to teach them theory.

Development of the third culture at TSI showed a
great deal of conflict between the norms, roles,
agendas, and motives of the students and those of the
instructor. However, as was seen from the results of

the quantitative study, the transfer of technology was
successfully taking place. At least three factors may
account for this. First, since the students who had
been at TSI the longer period of time had still only
been there for three months, the third culture was
still nascent. Second, as seen from the results of the
quantitative study, the students' interpersonal
interactions were generally positive. If, as Hawes and
Kealey (1979) contend, positive interpersonal
interaction is a factor in achieving the transfer of
technology, the positive overtones to the interactions
of the students and instructor indicate a strong
potential for the successful transfer of technology.
Finally, both the students and the instructor seemed
sufficiently motivated toward the accomplishment of the
transfer of technology to continue the difficult task
of building a constructive third culture. The transfer
of technology takes place more successfully in a
positive atmosphere than in a negative atmosphere.
This positive atmosphere is described by Johnson (1984)
as a positive "climate," or a "pattern of how people
talk to [interact with] one another..." (p. 124).

Indications were that, given time, chances were quite good that they would succeed.

Conclusion

Triangulation of Quantitative and Case Studies

Results from the quantitative portion (the CIDA instrument and exam scores) indicated that positive interpersonal experiences and expectations enhance the transfer of technology. Results from the case study (content analysis) portion indicated that definite differences existed between the norms, roles, agendas, and motives of two cultures, but that the potential existed for a constructive third culture to be built because of overall positive affect.

Although the two portions of the study were meant to answer different questions about the same subject, each of the two portions informed the other in two ways. First, the positive affect shown in the case study lent credence to the positive affect found in the answers to the questionnaire. Second, the case study may explain why the Group A scores from the expectation (A-C) scale were significantly lower than the Group B scores.

To begin with, the overall tone indicated by the scores on the expectations (A-C) and feelings (A-D) scales of the CIDA instrument, and by the case study interviews was positive. The case study showed that the students demonstrated considerable admiration and loyalty toward the Mexican-American instructor. Each of the students interviewed commented numerous times on their respect for the instructor. In turn, the instructor expressed his admiration for the work of the students.

Second, the case study may explain Group A's low scores on the expectations scale on the CIDA instrument. In other words, one interpretation that may be forwarded for the disappointment students in Group A expressed with the diesel mechanics program comes from the answers the students gave to the interview questions. This disappointment with the diesel mechanics program may indicate the development of less positive, but more realistic expectations as the students gained experience in the program and the level of technical difficulty of the material increased. That is to say, as time passed illusions were dismantled and expectations became more realistic (as

indicated by the differences between the scores of Group A and Group B). This indicates a conflict in agendas. However, as mentioned earlier, the positive affect that existed between the students and instructor suggested that this conflict would, in time, have been resolved. The third culture at TSI was, as yet, in only a nascent stage.

The purpose of this study was to discover ways in which to improve the transfer of technology between dominant and minority cultures. Results of the study indicated that positive but realistic expectations, interpersonal skills, positive affect, and a positive climate contribute most to the development of the third culture in which the transfer of technology takes place.

Limitations

This study had a number of limitations, both in the quantitative and the case study portions. The quantitative study was limited by the small sample size and the restriction to a vocational setting, which makes generalization to the general population less certain than would a larger sample size and more diverse setting.

Most important to substantiate that a transfer of
technology had taken place would be measures of
vocational success as defined at a place of employment.
Also, English competency scores would help validate the
CIDA scales. The qualitative study was limited by
losing half the poplation. In other words, both
portions this study were significantly limited by the
closing of TSI before all the data were collected.

Conclusion and Implications

The transfer of technology between cultures takes
place in the context of third culture building.
Cultures are constructed through communication.
Communication takes place against a background of
interpersonal interactions and both creates and
expresses norms, roles, agendas, motives, and climate.
This study has aimed at increasing understanding of the
mechanisms by which the third culture influences the
transfer of technology.

In this study, the transfer of technology was
successfully accomplished at TSI. Nevertheless, a
number of changes could have been made that may have
enhanced the program at TSI both in the areas of
results and satisfaction. Information from

intercultural competence and intercultural training
literature relates how to understand and work with the
differences between cultures in order to make the
transfer of technology smoother and more efficient, and
to increase the satisfaction of both students and
instructors (J. M. Bennett, 1986; M. J. Bennett, 1986;
Collier, 1989; Dinges & Lieberman, 1989; Kealey, 1989;
Martin, 1986; McCaffery, 1986; Paige, 1986; Ruben,
1989; Spitzberg, 1989).

First, although the field of intercultural
competence has not yet resolved the culture-general
versus culture-specific debate, in this case culture-
specific information would be useful. For example,
given that one of the training results at TSI was
dealing with supervisors, peers, and customers, very
explicit directions could be given for such encounters.

Second, in terms of intercultural training, both
knowledge of training goals and of the models for
intercultural training would have benefitted TSI. For
example, in terms of training goals, cognitive and
behavioral goals can be used to give advice to
instructors about the intercultural knowledge they
could integrate into their programs. Specifically, the

Mexican-American diesel mechanics instructor could present culture-specific content and discuss what can and cannot be accomplished in intercultural encounters. One example of this would be teaching students appropriate question-asking behavior.

Additionally, in terms of training models, an orientation program before classes started would prepare students for more realistic expectations from the program. Also, if intercultural training for the students were added to the orientation curriculum the level and frequency of satisfactory interpersonal interactions would be increased.

Overall, the successful transfer of technology for adults in a cross-cultural situation like TSI depends on the successful creation and negotiation of a third culture. Specifically, adjustments must be made in norms, roles, agenda, and motives. For example, with the conflict in role of teachers as caretakers or as supervisors, each teacher could work out his or her own role with the students, explicitly stating, "This is what we are doing here in this environment. When you go to work, expected and acceptable behavior will be ...."

Implications for Future Research

Results from these findings suggest three possible objectives for future intercultural communication research. First, this study indicates that the CIDA instruments deserve further testing and development. Second, the written theory and laboratory skills exam scores were useful measures of the transfer of technology for this study. However, a longitudinal study following the students into the workplace would provide additional information about success or failure of the actual transfer of technology. Evaluations of job performance would be a truer measure of the transfer of technology. Finally, studies looking at differences in the development of the third culture and the transfer of technology in different geographical locations would also be valuable.

As shown by the high internal reliability of the CIDA instrument, this study shows two things. First, the construct of the transfer of technology holds good in a vocational as well as a developmental setting. Second, the construct has validity whether the trainers are from the host culture or from the guest culture.

Thus, the transfer of technology does not depend on who is acculturating to a different culture.

This study emphasizes that the third culture is developmental (cf. Metzger, 1987; & Useem, Donoghue, & Useem, 1962) and that positive climate or positive affect is very important. For example, in this group positive affect was so important that in the early stages of the developing third culture, it could override conflicts in norms, roles, agendas, and motives. The relationship of affect to conflict needs more study.

Finally, results from this study indicate that universals may exist in the construct of the transfer of technology. The developing constructive third culture evident at TSI suggests that longitudinal studies conducted in a variety of settings will further clarify and define universals in the process of the transfer of technology.

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APPENDIX A

TABLES

Table 1: Correlations among Ability Measures

Measure (N=19)	C2	C3	C4	C5	C6	C7	C8	C9	C10
Interest in culture (C2)	---	.68***	.67***	.52*	.42	.08	.38	.65**	.16
English competency (C3)	---	---	.80***	.71***	.19	.34	.52*	.44	.04
NV Comm in English (C4)	---	---	---	.50*	.13	.45	.42	.20	.07
Know culture (C5)	---	---	---	---	.12	.15	.23	.55**	.20
Accept customs (C6)	---	---	---	---	---	.24	.37	.20	.29
Enjoy activities (C7)	---	---	---	---	---	---	.69***	.02	.01
Background (C8)	---	---	---	---	---	---	---	.22	.13
Personal commitment (C9)	---	---	---	---	---	---	---	---	.33
Sharing ideas (C10)	---	---	---	---	---	---	---	---	---

*$p < .05$
**$p < .01$
***$p < .001$

Table 2: Correlations among Expectations

Measure (N=16)	E1	E2	E3
Program will be rewarding (E1)	---	.37	.51*
Confident about preparation (E2)	---	---	.83***
Concerned about interacting (E3)	---	---	---

*p < .05
**p < .01
***p < .001

Table 3: Correlations among Feelings

Measure (N=16)	F1	F2	F3	F4	F6	F7	F8
Engl speaking instructors (F1) .64**	---	.79***	.48*	.45*	.44*	.18	
Span speaking instructors (F2) .54**	---	---	.75***	.63***	.55**	.33	
Classmates (F3)	---	---	---	.47*	.35	.37	.28
Meeting Americans (F4)	---	---	---	---	.95***	.90***	.31
New customs (F6)	---	---	---	---	---	.91***	.14
Interacting with Americans (F7)	---	---	---	---	---	---	.03
Health (F8)	---	---	---	---	---	---	---

*p < .05
**p < .01
***p < .001

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Table 4: Correlations among Quantitative Measures
CIDA Scales, Theory, and Skills

Measure (N=16)	Ability	Expectations	Feelings	Theory	Skills
Ability	---	.40	.64**	.24	.32
Expectations	---	---	.65**	.56*	.45
Feelings	---	---	---	.62**	.51*
Theory	---	---	---	---	.86***
Skills	---	---	---	---	---

  *p < .05
 **p < .01
***p < .001

APPENDIX B

CIDA SCALES

APPENDIX C

CASE STUDY QUESTIONS

Student Interview Questions

1. When you first started at Texas Schools, Inc. (TSI),
are there things that your American instructors at TSI
did that were different from what your instructors did in
Mexico? Explain.

2. When you first started at TSI, are there things that
your Mexican-American instructors at TSI did that were
different from what your instructors did in Mexico?
Explain.

3. Are there some things you wish your American
instructors at TSI did differently? Explain.

4. Are there things you wish your Mexican-American
instructors at TSI did differently? Explain.

5. What could TSI do to better meet your educational
needs?

Instructor Interview Questions

1. When the bilingual students first started at Texas
Schools, Inc. (TSI), were there some things they did
differently from American students? Explain.

2. Are there some things you wish your bilingual
students did differently? Explain.

3. Are there some things the bilingual students could do
to improve the educational climate? Explain.