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BRIDGING THE GAP BETWEEN HIGH SCHOOL AND COLLEGE

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The purpose of this study was to determine the effects of culturally appropriate English, mathematics, and career development curriculum on American Indian sophomore and junior high school students' academic achievement in a five-week summer program called Nizhoni Academy. The sample for this study consisted of 135 high school students: 39 males and 96 females. The sample included 103 Navajos, 24 Hopis, and 8 students who represented other American Indian Nations. The purpose of the Nizhoni Academy was to provide academic support services and direct instruction to educationally disadvantaged secondary students attending rural high schools on or near the Navajo and Hopi reservations in northeastern Arizona and New Mexico. The goals of the program were threefold: (a) to acquaint the American Indian sophomore and junior students to the rigors of college/university life, (b) to prepare students for continued academic success in high school, and (c) to provide an academic “bridge” that would better prepare Native secondary students in becoming academically successful in either the college or university.

Background

The majority of American Indian/Alaska Native children experience inferior elementary and secondary education due to limited academic resources in remote rural locations on reservations. In many cases, these students are also separated from their families, language, and culture. As a result of these limited educational opportunities, those who graduate from high school and enroll in colleges and universities are retained and graduate at rates that continue to lag far behind the national norms.

According to the National Educational Longitudinal Study (NELS:88) of eighth grade students, American Indians/Alaska Natives are less likely to be college bound than

other populations. For those who do enroll in college, the U.S. Bureau of the Census reported that between the academic years 1994-95, 1% of the American Indian/Alaska Native College student population received a bachelor's degree compared to 79% of students from the dominant culture group.

Pavel (1999) stated that there are several factors that negatively influence the transition from high school to college for American Indian/Alaska Native students: college admission test scores, core curriculum, course completion, and the proportion of students meeting certain college admission criteria (i.e., college preparation curriculum). The Scholastic Aptitude Test (SAT) and the American College Test (ACT) are the more predominant college admissions tests administered to college bound students. Although by American Indian/Alaska Native students have increased these scores between 1987 and 1997, they still lag behind the rest of the nation in both tests. American Indian/Alaska Native students ranking below the national average in completion of core curriculum for high school graduation is coupled with the fact they lack opportunities to enroll in college preparatory programs at their high schools.

With these types of low percentages in evidence, what must our institutions of higher education (IHEs) do to better prepare, retain, and increase the graduation rates of the American Indian/Alaska Native college students? A recent report on colleges from the Carnegie Foundation for the Advancement of Teaching (1997) suggested that the first problem IHEs encounter is the discontinuity between secondary school and higher education processes. Sanders (1987) reported that much of what American Indian/Alaska Native students find in non-Indian education institutions runs contrary to the social norms, self-perceptions, and expected behaviors that have been learned and

reinforced in their own home cultural community. Boyer (1997) indicated that the transition to college for many American Indian/Alaska Native students can be a disorienting experience. Being separated from home, American Indian/Alaska Native students experience the discomfort of dealing with unfamiliar values and expectations. In addition, many young American Indian/Alaska Native students arrive at college/universities with underdeveloped skills in reading, writing, and comprehension. With these factors in mind, IHEs are faced with major challenges and responsibilities to assist talented American Indian/Alaska Native secondary school students with disadvantaged backgrounds in order to assure their enrollment, retention, and success.

Arizona ranks as the 25th state in total population, 3rd in American Indian population, and 8th in Hispanic population. The state is sparsely populated and characterized by a large number of small, rural school districts and a few large urban school districts. The majority of the schools in the 227 school districts have a significant numbers of students who lack English language skills, who are of lower socio-economic status, and who are migrants. According to Moles (1993), the disadvantaged are all those in American society who are unable to fully participate because of social and economic limitations. American Indian/Alaska Native students—especially from reservations—usually fit this definition. Unless the rate of success in education is improved, current trends in Arizona's competitive economic environment lead to even greater disadvantages and lower levels of attainment.

It is a goal of many Native Nations that their young members succeed in higher education. However, the extent of college preparation has been a factor that determines how successful students will be in meeting the rigorous demands of higher education.

Educators and researchers have been concerned and suggest that IHEs must take an increasingly pro-active role in establishing educational partnerships with American Indian/Alaska Native Nations/communities. According to the National Commission on Excellence in Education (1991), promoting partnerships between schools and communities is considered to be one of the urgent topics on the National agenda. Anderson (1982) and Elcholtz (1984) confirmed that the positive impact of such partnerships is well documented. Research specifically suggests that schools of the future must be redesigned with the assistance of the community at large (U.S. Department of Education, 1991). Partnerships between IHEs and local American Indian/Alaska Native communities will create the dialogue necessary for American Indian/Alaska Native students to ultimately succeed in education. Without these partnerships, lower graduation and retention rates will surely persist.

A student needs assessment conducted by Cibik (1991) posed the question to American Indian college students: “What do you consider your present obstacle, if any, to completing your degree?” Sixty percent indicated completing and passing classes with good grades as the primary obstacle. Astin (1982) confirmed that one of the obstacles for American Indian/Alaska Native undergraduate students entering an IHE was poor educational preparation. Falk and Aitken (1984) have documented similar findings; they surveyed American Indian students who ranked the lack of adequate academic preparation in high school as a top obstacle to college completion. In the same study, 76% reported that they were either “somewhat prepared” or “not at all prepared,” and that success and retention at the IHE was hindered as a result. In other studies, Minner (1995) and Wells (1989) reported that American Indian students often

left school because of “inadequate and poor [academic] preparation.” Wells noted that a closer examination of overall Native student academic failure during the freshman year in college revealed an underlying but specific pattern of failure in introductory math, science, and English courses.

It is often a shock to students who have graduated from high school and who were encouraged to consider postsecondary education to find themselves academically unprepared. Unfortunately, many drop out of college because they interpret this academic deficiency as their own lack of ability. Tijerina and Biemer (1988) noted:

> Indian high school students who are still interested in college are often underprepared. Many start with low self-esteem. Many must overcome the disadvantage of attending a small rural high school that does not offer the needed science courses . . . few Indian high school students have suitable role models, and few are advised about professional career opportunities. (p. 90)

Review of the Literature

Educators across the country have been interested and concerned about the causes of failure in American Indian/Alaska Native education. There are some areas of disagreement among educators of American Indian/Alaska Native students and the general public; however, there is agreement on several influential factors:

- Low socioeconomic status (Byrne, 1989; Dolman & Kaufman, 1984)
- Differences in how American Indian/Alaska Native students learn as compared to the dominant culture (Lippitt, 1993; Rhodes, 1989; Swisher & Pavel, 1994)
- Problems associated with the acquisition of English as a second language (Byrne, 1989; Dankworth, 1970; Dolman & Kaufman, 1984)

- Curriculum that does not meet the needs of American Indian/Alaska Native students (Gilbert, 1997; Gipp & Fox, 1991; Stoles, 1997; Yazzie, 1999)
- The lack of well trained teachers and administrators (Blumhagen, 1984; Dupris, 1979; Gunsky, 1979)
- The lack of student and parent motivation (Byrne, 1989; Wilson & Black, 1978)
- The conflict that results from a lack of understanding of cultural differences between the home/culture and the school (Gilbert, 1997; Plank, 1994; Wright, 1998),
- The lack of appropriate funding (Tippeconnic III, 1988)
- Preparation for postsecondary education (Hoover & Jacobs, 1992; Pavel, 1999; Tate, & Schwartz, 1993)
- Low self-concept (Abdel-Mawgood & Hatch, 1973)
- The lack of well trained teachers in the pedagogy of teaching science education (Cajete, 1999; Gilbert & Carrasco, 1997; Rowland & Adkins, 1995)
- Testing bias (Brescia & Fortune, 1988).

Swisher (1990) noted that the educational system in its current form promotes styles of teaching found to be incongruent with traditional values and styles of learning that characterize many American Indian/Alaskan Native students. The American educational system is founded upon Euro-American middle-class values that often run contrary to traditional American Indian/Alaska Native values and styles of learning. American Indian/Alaska Native children are raised in home and community environments where cooperation and interdependence are valued over competition and individualism. Yet,

the lack of understanding on the part of the educational system of such differences in values has resulted in the conceptualization of “cultural deficit” in which American Indian/Alaska Native students have been blamed for their own educational failures in the American education system. To the contrary, the American Indian/Alaska native student is just as capable of succeeding academically and socially as any other student. The cultural differences that American Indian/Alaska Native students bring to the classroom should be accepted and accommodated by the educational system as manifesting learning styles equal to any other, regardless of the ethnicity or race of the student.

Children from group-oriented cultures, such as those of American Indians/Alaska Natives, develop a preference for working in groups over individual assignments. Swisher (1994) noted that cooperation and the influence of the Native family had an effect on student learning; this supported her earlier findings (1990) that Native children raised in a cooperative home or community environment do exhibit signs of cooperation in their approach to learning. Philips (1983) in her historical study of the Warm Springs Indian Reservation found that American Indian children were reluctant to participate in large and small group recitations. Instead, the students preferred working in small [cooperative learning] groups that promoted student leadership within the group with the classroom teacher assuming the role of facilitator.

In some instances, the concept of cooperation can be misunderstood when it is identified as a cultural characteristic. For example, among the Hopi people, one enters a traditional foot race recognizing that the sole purpose of racing is for the good of the people and that winning is not an individual goal. Instead, a goal in which everyone

shares in the victory emphasizes that “sharing” is more important than individual reward. Unfortunately, in some classrooms, teachers who are not culturally sensitive may interpret this value as a form of “cheating.” On the other hand, a teacher who is culturally sensitive might aid these students by providing opportunities for cooperative learning, allowing students to work one-on-one and in small groups. This would be a more humanistic approach to teaching that is congruent with Native cultural values and learning styles. Instructional strategies such as the utilization of group work, cooperative learning, and tutoring services or assistance show promise of making a difference in the area of American Indian academic achievement. These strategies also support positive self-concept.

Swisher and Deyhle (1992) have asserted that teachers should provide students with classroom experiences that are compatible with their students’ learning modalities. Although competition plays a role in academic performance of all students, cooperative learning modalities have been underutilized, to the detriment of children who are disinclined toward competitive learning modalities. Recognizing that American Indian/Alaska Native students bring to the classroom a vast amount of prior knowledge and experiences, the metacognitive approach was utilized most effectively by capitalizing on existing memory structure (schemata), and building on previous knowledge and experiences of the student (Swisher & Deyhle, 1992).

Test anxiety or lack of test-taking skills is one of the factors attributed to the low test scores of American Indian students. Rhodes (1989) concluded that the right-brain dominance of American Indian students tends to subordinate left-brain skills, such as notetaking and summarizing. In the middle class sense, study habits and attitudes are

considered to be factors that impede learning by American Indian/Alaska Native students. In an effort to build skills for student success in this area, Rhodes described a program where teachers, counselors, and tutors were specifically trained to develop these skills and then required to teach accordingly. Instructional manuals concerning critical thinking skills were also developed and given to the teachers as guides for implementation of their curriculum (Rhodes 1989).

Another factor that confounds American Indian/Alaska Native students' learning is the lack of interest or ability on the part of students to relate to subject matter (Byrne, 1989). American Indian/Alaska Native students may not be motivated to participate in instructional conversations at school because they are disinterested in the topics or issues discussed in class. Often, these topics or issues are based on the majority culture frame of reference and may not be felt as relevant to the daily lives of the American Indian/Alaska Native students. Byrne described a program developed to motivate the participating Native students to overcome these problems. Teachers, counselors, and tutors were introduced to the cultural background of the students, as well as notions of holistic language (language that geared itself to the cultural background of American Indian students). Several American Indians were invited to be guest speakers and an article written by an American Indian author describing the life style on American Indians on a reservation was selected as part of the English curriculum. Teachers were guided in teaching and designing their lesson plans to be more responsive to the cultural background of their students (Byrne, 1989).

In order for American Indian education to enjoy success, the literature suggests that the elimination of negative factors and conditions is tied to the educational systems'

willingness to facilitate and to respond accordingly to a greater understanding of the cultural background of American Indians/Alaska Natives. Educational institutions have labored under the assumption that in order to educate the American Indian/Alaska Native appropriately, the student must be first be culturally assimilated so that the process becomes easier for all. Unfortunately, this philosophy is based on considerable historical precedent that has had a demonstrably negative impact on all American Indian/Alaska Native Nations. In addition, some factors such as low-socioeconomic status and isolated living on reservations can be difficult to mitigate directly with anything less than long-term and highly sustained strategies. However, educational practitioners, teachers, and administrators can help by instituting programs of appropriate instruction that will give higher risk students the tools to help improve their own learning as well as aid in the long-term socioeconomic status of their home communities.

The Program

In an effort to address the issues of academic preparedness and motivation, Northern Arizona University (NAU), the University's Center for Excellence in Education (CEE), the Navajo and Hopi Nations, and parents/communities formed a partnership to promote success for future Native college students. The goal of this partnership was to create effective and supportive precollege services leading to future success for educationally disadvantaged American Indian students who come from low-socioeconomic families, and who attend rural schools on or near the Navajo and Hopi reservations in the state of Arizona, Colorado, Utah, and New Mexico. This goal would be accomplished by acquainting and orienting the American Indian sophomore and

junior students to the rigors of college or university life, preparing them as students for continued academic success in high school, and constructing an academic “bridge” that would better prepare them for effective functioning in a college or university. This program is known as “Nizhoni Academy,” which in the Navajo language means “beautiful, to be beautiful” (Young & Morgan, 1987, p. 825).

In order to achieve its goals and purposes, this program had to effectively facilitate some curricular change as well as design and implement an array of supplementary academic experiences with the cooperation of participating secondary schools. In accomplishing this, the project demonstrated that a cooperative effort among IHEs, parents, communities, and local education agencies (LEAs) could be a significant mediator in the academic success of American Indian/Alaska Native students. The formation of partnerships with the Navajo and Hopi Nations, in particular, demonstrated the efficacy of such working relationships, creating also a sense of trust, and opening a path for open communication and further collaborative efforts.

Program Description

Nizhoni Academy is offered as an intensive, five-week college preparatory summer program, conducted during the summer months by NAU under the auspices of Educational Support Programs (ESP) at the University. The academy achieves its goals by providing (a) 160 hours of instruction in the foundation courses of composition, mathematics, and career development with reading, study skills, and computer literacy incorporated into the classes; (b) skill development in the areas of English and mathematics; (c) study skills development; (d) goal setting, clarification of self-esteem building values, and career development activities; (e) ACT preparation workshops; and

(f) cultural and recreational activities that reflect many facets and realities of university and college life.

By introducing the students to a demanding curriculum, the Academy helped prepare students for continued academic success in high school, as well as instilling in them a sense of what would be expected in the future. Through these efforts, the Academy endeavored to provide an experience that ensured a smooth transition from high school to a postsecondary institution.

Philosophy of Nizhoni Academy

The task of providing quality services is a reflection of the philosophical foundation of the program (Educational Support Programs, 1997). The philosophy focused on five aspects of learning—*metacognition, concentrated learning, cooperative learning, a process approach*, and *critical thinking skills*.

Metacognition is used to develop the students' self-awareness process of how they learn and organize new material. The student acquires an understanding of the relationship of his or her strengths and weaknesses; what methods make learning easier; which strategies work well; and what limitations exist. This self-awareness allows students to identify and use their assets and to seek personal changes that allow them to be successful learners and contributors to society. *Metacognition* was explored in terms of learning new study skills, identifying one's learning styles, as well as a helping students formulate useful approachs in making plans for the future.

Concentrated learning is a method to help students achieve complete understanding of subject material and how to remember it well. It is applied once material is already learned in-depth and supports a high level of competency for future applications of that

knowledge. It may require several exposures, allowing those with less developed skills to achieve the same level of knowledge that good learners quickly gain. Once a complete understanding is achieved, all students retain material more efficiently and are better able to apply it.

Cooperative learning utilizes a group structure approach wherein students contribute collaboratively to academic tasks and assist their fellow members to reach their academic objectives. The cultural processes used for learning American Indian traditions and religious beliefs suggest that American Indian students learn in a time frame that allows individualized progress, fosters cooperation, and incorporates frequent exposure. Cooperative learning experiences are consistent with the cultural learning that the American Indian students have experienced during their youth.

The *process approach* focuses on learning and instruction at different stages of performing particular cognitive tasks. This approach breaks a complex activity, such as writing, program solving, or decision-making, into preactivities (motivation, preparation, and assessment of tasks); during activities (writing a rough draft or solving a problem); and postactivities (follow-up, summarization, or evaluation with alternatives). These “before,” “during,” and “after” approaches were applied to all academic tasks (studying, writing, reading, problem-solving, critical thinking) and applied in examining developmental life issues of students, on the one hand, and understanding the expectations of institutions, on the other hand.

Critical thinking involved three primary abilities: (a) the ability to recognize the central concern of an issue, question, or problem and to look at that particular issue, question, or problem from a variety of different perspectives; (b) the ability to apply different

problem-solving strategies to a particular issue, question, or problem; and (c) a definite personal mental or psychological attitude that results in an individualist activity of questioning what s/he reads, what s/he hears, and what goes on around him/her in the world. The development of critical thinking skills contributes to the students' greater understanding of academic material, enhances their survival strategies, and helps them to better integrate general life experiences.

Program Objectives of the Nizhoni Academy

The program objectives were to (a) provide an early introduction to university and college academic life while providing a support system to guide and motivate students; (b) provide workshops and course assignments utilizing computers; (d) utilize a curricular model that was constructed on the basis of previous program experience, incorporating research related to cognitive retention and multicultural education of American Indian students; and (d) promote constructive interaction among peers, instructors, and other staff members.

The students were introduced early to either university or college academics focused on foundation courses, which included courses in English, mathematics, and career development. The English course utilized a "thematic" approach to instruction, which included students' skill development in writing a three-point, five-paragraph essay. Films, music, and discussion groups served as motivators for these essays. The mathematics course focused on the development of the students' problem-solving skills. Students worked on strategies and approaches to problem solving through exercises and creative activities, and classroom content covered numerous stylized word problems. Since the majority of the participating students spoke English as a second

language, the design of the course forced them to deal with various language structures to present mathematical concepts and to write about mathematics, frequently utilizing personal journals.

The career development course guided students through a decision-making process directed toward selecting a career area. Students learned the steps involved in making an important decision, including the gathering of information from a variety of sources such as the *Vocational Interest Experience and Skills Assessment* (VIESA) to help identify career interest areas. In addition, a career college fair was organized that provided students the opportunity to speak with representatives from various colleges and universities. Seminars were also held for students that included such topics as time management, ACT preparation, self-esteem, racism, urban survival skills, and preparation for high school graduation.

The students were offered workshops and course assignments utilizing computers. The emphasis was on increasing students' mastery of the basic computing skills, while orienting them to the role of computer play in modern society. As with the academic year, computer lab hours were extended so that students had access to them after school and on weekends.

The curricular model focused on selected, important academic skills, which were studied and practiced in a variety of ways until students obtain mastery of the target skill. The approach also incorporated a holistic emphasis on the relationship needed between academic progress and non-cognitive attributes, such as self-esteem, values, goals, and support systems.

Student activities that were included in the extracurricular activity component included cultural and recreational activities that helped students to develop social skills.

Study Methods

Research Questions

The following research questions guided the inquiry:

1. Based on demographic factors (gender, grade level, and type of school attended), how is student academic achievement affected within a five-week period as measured by the mathematics posttest scores?
2. Based on demographic factors (gender, grade level, and type of school attended), how is student academic achievement affected within a five-week period as measured by the English posttest scores?
3. What is the impact on career development on American Indian students within a five-week period as measured by the *Career Development Assessment Instrumentation*?

Null Hypotheses

One—mathematics within group evaluation: There is no significant difference between mathematics pre- and posttest scores for the entire sample as well as for male and female students, for sophomore and junior grade levels, and for public and non-public school students.

Two—English within group evaluation: There is no significant difference between English pre- and posttest scores for the entire sample as well as for male and female

students, for sophomore and junior grade levels, and for public and non-public school students.

Three—career development entire sample: There is no significant difference in career development pre- and posttest scores for the entire sample.

Sample

The sample consisted of a total of 135 American Indian students, 39 males (29%) and 96 females (71%). The sample included 77 high school sophomores (57%) and 58 high school juniors (43%); 103 Navajo students (61%), 24 Hopi students (14%), and 8 students from other American Indian Nations (25%). The majority of the students in this study were Hopi and Navajo participants, representing 75% of the total student population. One hundred-thirteen students (84%) attended public schools, and 22 students (16%) attended non-public schools (See Table 1).

Table 1. Number and Percentage of Subjects by Gender, Grade Level, and Type of School Attended

Gender	n	%	Grade	n	%	School	n	%
Male	39	29	Soph.	77	57	Public	113	84
Female	96	71	Junior	58	43	Non-Pub.	22	16

Limitations

The following limitations applied to this study and could have influenced the generalizability of the findings:

1. The mathematics test is assumed, for this study, to test representative knowledge and skills reflecting academic achievement in mathematics.
2. Since the subjects were mainly self-selected, American Indian students, the generalizability of the results is limited.
3. No randomization procedures were employed, nor was a control group used in the study; therefore, the confounding of selection bias, history, and testing pose internal validity threats.
4. Since the program was conducted during the summer, the students' participation was a period of five weeks.

Design

Data for this study were gathered from the following test sources: (a) English, (b) mathematics, and (c) career development. The mathematics and English tests were administered twice—once before and once after the five-week summer session. The mathematics instrument was a teacher-made test. Pre- and posttests were the same, containing three levels (Algebra A, B, and C) depending on student ability. One hour was required to finish the test. The English test was also a teacher-constructed test. Part one measured summarization ability, and part two measured writing ability. The pre- and posttests were the same.

The evaluation process of the career development component was conducted at each school site, before the students arrived for the summer program. The career development evaluation form included 15 questions relating to the students' overall feeling about their career goals and opportunities available to them after graduation

from high school. The responses were evaluated on a 1 to 5 scale, with 1 being “definitely uncertain,” to 5, being “sure."

Data Analysis

To analyze student overall performance in the content subjects of English and mathematics, a two-tailed dependent *t*-test was employed. The results indicated that students did significantly better in both the mathematics posttest (t = 12.71, df = 134, p < .001), and the English posttest (t = 15.03, df =130, p < .001). The mean score for the mathematics pretest was 2.54, and the mean score for the posttest was 4.46, indicating a gain of 1.92 points.

For the English component, the pretest mean score was 3.80, and the posttest mean score was 5.82, indicating a gain of 2.02 points (see Tables 2 and 3). As indicated by the statistical data, students in both English and mathematics content areas improved significantly, thus indicating that the treatment rendered during the Nizhoni Academy was not only helpful, but also proved successful in improving the academic skills of students in both areas.

Table 2. Dependent *t*-Test on Mathematics for the Entire Sample

Group	Mean	s	Gains	d.f.	*t*	*p*
Pretest	2.54	1.40	1.92	134	12.71	$p < .001$
Posttest	4.46	1.69				

Table 3. Dependent *t*-Test on English for the Entire Sample

Group	Mean	s	Gains	d.f.	*t*	*p*
Pretest	3.80	1.40	2.02	130	15.03	*p* < .001
Posttest	5.82	1.50				

Mathematics

Gender: As a result of the mathematics component related to gender, both the male and female students showed dramatic improvement as indicated by the mathematics posttest. For the male students, their pretest mean score was recorded at 2.67, and their posttest mean score was recorded at 4.23, indicating a 1.56 point gain. Thus, statistical significance was found for the male students ($t = 5.52$, df = 38, $p < .001$). For the female students, their pretest mean score was recorded at 2.49, and their posttest mean score was recorded at 4.56, indicating a 2.07 point gain. Thus statistical significance was found for the female students ($t = 11.91$, df = 95, $p < .001$), using the two-tailed dependent t-test for both male and female subjects (see Table 4).

Table 4. Dependent *t*-Test on Mathematics by Gender

Gender	Test	Mean	s	Gains	d.f.	*t*	*p*
Male	Pretest	2.67	1.31	1.56	38	5.25	*p* < .001
	Posttest	4.23	1.53				

Female	Pretest	2.49	1.45	2.07	95	11.91*p* < .001
	Posttest	4.56	1.75			

Grade level: A comparison was made between the sophomore and junior students to determine if grade level had any effect on academic achievement in the area of mathematics. Both sophomore and junior students performed significantly better in the mathematics posttest. For the sophomore subjects, their pretest mean score was recorded at 2.38 and their posttest mean score was recorded at 4.44, indicating a gain of 2.06 points. Thus, statistical significance was found for the sophomore subjects (t = 9.94, df = 76, p < .001). For the junior subjects, their pretest mean score was recorded at 2.76, and their posttest score was recorded at 4.48, indicating a gain of 1.72 points. Thus, statistical significance was found for the junior subjects (t = 7.95, df = 57, p < .001). Overall, regardless of grade level, the results revealed a dramatic improvement for both sophomore and junior students (see Table 5).

Table 5. Dependent *t*-Test on Mathematics by Grade Level

Grade Level	Test	Mean	s	Gains	d.f.	*t*	*p*
Sophomore	Pretest	2.38	1.38	2.06	76	9.94	*p* < .001
	Posttest	4.44	1.71				
Junior	Pretest	2.76	1.43	1.72	57	7.95	*p* < .001
	Posttest	4.48	1.68				

Attendance at Public vs. Non-Public Schools on Mathematics Performance

Participants in this program included students from public and non-public schools on the reservations. A comparison was made to determine if there were any differences in academic performance between the two. Overall, students did significantly better in the mathematics posttest regardless of type of school attended. Students attending the public schools recorded a pretest mean score of 2.49 and a posttest mean score of 4.36, indicating a gain of 1.87 points. Thus, statistical significance was found for the students who attended public schools (t = 11.12, df = 112, p < .001). For the students who attended non-public schools, they recorded a pretest mean score of 2.82 and a posttest mean score of 5.0, indicating a gain of 2.18 points. Thus, statistical significance was found for the students who attended non-public schools (t = 6.43, df = 21, p < .001; see Table 6).

Table 6. Dependent *t*-Test on Mathematics by Schools

Schools	Test	Mean	s	Gains	d.f.	*t*	*p*
Public	Pretest	2.49	1.47	1.87	112	11.12	$p < .001$
	Posttest	4.36	1.68				
Nonpublic	Pretest	2.82	1.05	2.18	21	6.43	$p < .001$
	Posttest	5.00	1.69				

English

Gender: The majority of American Indian students in this study indicated that English was their second language. The attempt was to determine if the English course made a difference in student academic performance in the area of comprehension and if any gender differences in student performance were in evidence.

As a result, the male students' pretest mean score was recorded at 3.69 and their posttest mean score recorded at 5.72, indicating a gain of 2.03 points. Thus statistical significance was found for the male students ($t = 6.96$, df = 34, $p < .001$).

For the female students, their pretest mean score was recorded at 3.84, and their posttest mean score was recorded at 5.85, indicating a gain of 2.01 points. Thus, for the female students, statistical significance was found ($t = 13.41$, df = 95, $p < .001$; see Table 7).

Overall, both the male and female students did significantly better in the English posttest, thus indicating that the English curriculum was beneficial regardless of gender.

Table 7. Dependent *t*-Test for English by Gender

Gender	Test	Mean	s	Gains	d.f.	*t*	*p*
Male	Pretest	3.69	1.45	2.03	34	6.96	$p < .001$
	Posttest	5.72	1.51				
Female	Pretest	2.84	1.38	2.01	95	13.41	$p < .001$
	Posttest	5.85	1.50				

Grade level: As a result of the English posttest, sophomore and junior students demonstrated dramatic improvement in the English posttest. Grade level was not a factor in determining how successful students would be. As a result, the sophomore students' pretest mean score was recorded at 3.61 and their posttest mean score was recorded at 5.68, indicating an increase of 2.07 points. For the junior students, their pretest score was recorded at 4.05 and their posttest score was recorded at 6.00, indicating an increase of 1.95 points.

As a result, statistical significance was found for both sophomore and junior students and grade level did not appear to be a factor. Values for *t* were calculated for sophomore students (t =12.06, df = 73, $p < .001$), and junior students (t = 9.08, df = 56, $p < .001$; see Table 8).

Table 8. Dependent *t*-Test on English by Grade Level

Grade Level	Test	Mean	s	Gains	d.f.	*t*	*p*
Sophomore	Pretest	3.61	1.43	2.07	73	12.06	$p < .001$
	Posttest	5.68	1.53				
Female	Pretest	4.05	1.32	1.95	56	9.08	$p < .001$
	Posttest	6.00	1.45				

Attendance at Public vs. Non Public Schools on English Performance

Participating students attended either a public or a non-public school during the regular school year. The intent of this portion of the analysis was to determine if attending a public or a non-public school made a difference in student academic performance at the conclusion of the English course. Those students who attended a public school recorded a pretest mean score of 3.84 and a posttest mean score of 5.86, indicating an increase of 2.02 points. For those students who attended a non-public school, they recorded a pretest mean score of 3.62 and a posttest mean score of 5.62, indicating an increase of 2.00 points.

As a result, statistical significance was found for both public ($t = 13.40$, df = 109, $p < .001$), and non-public school students ($t = 7.03$, df = 20, $p < .001$; see Table 9). Thus, regardless of which type of school the students attended during the regular school year, both populations benefited from the five-week English course offered to them during this program.

Table 9. Dependent *t*-Test on English by School

School	Test	Mean	s	Gains	d.f.	*t*	*p*
Public	Pretest	3.84	1.42	2.02	109	13.40	$p < .001$
	Posttest	5.86	1.50				
Nonpublic	Pretest	3.62	1.28	2.00	20	7.03	$p < .001$
	Posttest	5.62	1.50				

Career Development

Overall evaluation: As indicated earlier in this paper, the participating students were administered the pretest of the Career Development Assessment Instrument, and were again, administered the posttest at the conclusion of the five-week summer program. The mean score for the pretest for all students was recorded at 84.60, and the mean score for the posttest was recorded at 89.81 points, indicating an increase of 5.21 points overall.

Overall, statistical significance between pre- and posttest results were found using dependent *t*-test ($t = 9.38$, df = 137, $p < .001$). This indicated that Nizhoni Academy's instruction in career opportunities along with the career fair conducted for one day significantly benefited all students. That is to say that the student, upon completion of the summer program, had a better knowledge of and a very positive feeling about what careers they were interested in pursuing or the careers that were available to them once they graduated from high school and were ready to attend college (see Table 10).

Table 10. Dependent *t*-Test Career Development for the Entire Sample

Subject	Test	Mean	s	Gains	d.f.	*t*	*p*
Career Development	Pretest	84.60	11.20	5.21	137	9.38	$p < .001$
	Posttest	89.81	7.63				

Findings

Academic Achievement

In this study, there were three research questions posed regarding the effectiveness of academic achievement in the subject areas of mathematics and English, and the impact of career development among American Indian secondary students. As a result of these questions, hypotheses were drawn to test statistical significance.

Null Hypothesis One—mathematics within group evaluation: Hypothesis one stated that there is no significant difference between mathematics pre- and posttest scores for the entire sample as well as for male and female students, for sophomore and junior grade levels, and for public and non-public school students. The data indicated that students generally did significantly better in the mathematics posttest regardless of gender, grade level, or school differences. Statistically significant improvement was found at the $p < .001$ level for both genders, both grade levels, and both public and nonpublic school students. The present study supported previous research, which has indicated that *cooperative learning* and *tutoring* significantly benefited American Indian student academic achievement. Thus, null hypothesis one was rejected.

Null Hypothesis Two—English within group evaluation: Hypothesis two stated that there is no significant difference between English pre- and posttest scores for the entire sample as well as for male and female students, for sophomore and junior grade levels, and for public and nonpublic school students.

Again, the data indicated that as a whole, the students overall improved significantly in the English posttest scores. This held true for both male and female students regardless of their grade level or the type of school they attended. Significant positive changes between pre- and posttest scores were found for all subgroups: gender, grade level, and public and non-public school students at the $p < .001$ level. Therefore, null hypothesis two was rejected. The treatment appeared to have a significant and positive impact as a result of the English curriculum for all students involved during the five-week summer program.

Career Development

Null Hypothesis Three—Career development: Entire sample: Hypothesis three stated that there is no significant difference in career development pre- and posttest scores for the entire sample. Overall, the participating students did significantly better on the posttest at the $p < .001$ level. Thus, null hypothesis three was also rejected. One of the reasons why students demonstrated an interest in attending the summer program at NAU is that these students recognized the program as a way of preparing themselves academically for the rigors of university and college life.

Discussion

Expectations for these students ran high while they attended the program; and as a result, these students recognized the importance of such a program. The purpose of the program was to help the American Indian students better prepare themselves so that what they were taught and what they learned would help carry them across the “bridge” constructed by this NAU/CEE program.

One of the main teaching strategies used in this program in teaching American Indian students was the use of cooperative learning groups. In many educational research reports and findings pertaining to the American Indian student population, it has been demonstrated repeatedly that cooperative learning is a very effective way of teaching American Indian students, and perhaps more importantly, it parallels the cultural ways of living and learning in the American Indian culture. In essence, it is a way of life, thus, is a relevant way to teach American Indian students. One of the strong points of cooperative learning is that it provides for student interaction, which leads to students tutoring one another.

As Goodlad and Hirst (1989) pointed out, the strength of tutoring is in allowing students to receive more teaching, more individualized instruction, and more frequent response from their peers. Cooperative learning with its benefit of using peer pressure as a motivation to learn has been found effective in improving student academic achievement (Madden & Slavin, 1983; Slavin & Oickle, 1981). Thus, the combined implementation of these two teaching/learning strategies in both classroom structure and after-school settings (the evening tutoring session), as in the case of this program, is expected to have significant positive impact upon student learning. As a starting point

to assess the success of the students and the curriculum of this program, it was imperative that a research protocol be established to collect data and to determine how successful this program was for the American Indian secondary students?

Certainly, according to NAU/CEE staff, faculty, and participating students, the program, indeed, provided such an avenue for preparing American Indian secondary students for the rigors of college and university life. As a result, they are better prepared to fulfill their dreams and aspirations for a career of their choice, and to participate in and become productive contributors to the larger American society.

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