To the Graduate Council:

I am submitting herewith a dissertation written by Trenton Cooper entitled "Articulation for Physical Science and Mathematics in Arkansas Colleges and Universities." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education, with a major in Curriculum and Instruction.

A. Paul Wishart, Major Professor

We have read this dissertation
and recommend its acceptance:

Accepted for the Council:

Vice Chancellor
Graduate Studies and Research

ARTICULATION FOR PHYSICAL SCIENCE AND MATHEMATICS IN ARKANSAS COLLEGES AND UNIVERSITIES

A Dissertation

Presented for the

Doctor of Education

Degree

The University of Tennessee, Knoxville

Trenton Cooper

August 1981

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DEDICATION

This manuscript is dedicated to my wife, Gwendolyn, and my daughters, Adrienne and Edris Rochelle, whose support, encouragement and assistance made its completion possible.

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ABSTRACT

This study collected, examined, and analyzed data relative to the process used by students transferring from junior to senior colleges within the state of Arkansas. The primary emphasis of this study was on Physical Science and Mathematics.

Thirty-two degree-awarding institutions within the state of Arkansas provided the data for this study. The information was collected by utilizing a questionnaire and interviews. Sixty-one statements divided into five sections were contained in the questionnaire. The statements were formulated from Guidelines for Improving Articulation Between Junior and Senior Colleges developed by the Joint Committee on Junior and Senior Colleges. These statements are considered desirable for an effective articulation program.

The returned responses were used to formulate a two by two table. Frequencies from each table were then used to calculate a chi-square and a contingency coefficient. These measures were used as a means of determining whether there were differences in opinion of key agents as to desired practices and current practices for the articulation process within the state of Arkansas.

The major findings of the research indicated that less than 40 percent of the statements formulated from the Guidelines showed differences of opinion as to desired practices and current practices. In all five divisions of the questionnaire, the general opinion of the key agents showed no significant difference between desired practices and current

practices. The opinion of key agents further indicated that many of the ideas in the Guidelines were being practiced but a significant number of them were neither desired nor practiced.

Administrators and/or policymakers should find the research useful as an aid in making decisions relative to practices for improving articulation programs.

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CHAPTER I

INTRODUCTION

The last few years have seen great growth and development of community colleges. These two-year colleges have as a major goal the making of higher education available to a larger number of college-age youth while keeping the cost to the taxpayer and the student to a minimum. The need to improve articulation between two- and four-year colleges was recognized in action taken by the Association of American Colleges and the American Association of Junior Colleges in 1957 (Knoell and Medsker, 1965).

The Carnegie Commission in a study in 1973 listed four phases in American education. The fourth phase, 1970-2000, pinpoints factors that must be given some serious consideration for continuous improvement in higher education.

> A majority of high school students, perhaps two out of three, enter some form of post-secondary education. New constituencies of post-secondary students come from the lower academic ranks of high school classes, older persons, more women, more part-time participants, and more minorities. (Carnegie Commission, 1973, p. 2)

Many of these students start in community and/or junior colleges with the idea of stopping at the end of some two-year program, but once entering, decide to continue in a four-year college or a university.

This study identified the articulation process and agreements as they relate to the Physical Sciences and Mathematics within the system of higher education in the state of Arkansas. In higher education, there is

a need for some criteria to serve as guidelines for decision-making as to the status of transfer students as they move from one type of institution into another. This study includes data which will be valuable in assisting decision-making relative to the status of transfer students in the areas of Physical Science and Mathematics.

I. THE PROBLEM

A few states have started giving increased consideration to the problem of students transferring from two-year institutions to four-year colleges and universities. California in its system of higher education, where there are many two-year institutions, has been the target for several articulation studies. In 1979, the Tennessee Association for Colleges of Teacher Education (TACTE) presented a document that covered the role and scope of teacher education in Tennessee and identified some problems associated with articulation in Tennessee. This TACTE document contains a proposed articulation agreement between public community colleges and public universities in Tennessee, including guidelines for evaluating the status of transfer students. Some criteria were given for determining what courses shall be accepted and how credit can be determined.

Articulation procedures should be initiated for other areas of study if additional admissions requirements are not to be imposed upon transfer students.

> Articulation is communication and cooperation between two or more groups in developing their guidance program so that quick and easy orientation of individuals shifting from one program to another is facilitated. . . . (Good, 1973, p. 42)

This study was designed to examine the articulation process between the colleges and universities in the state of Arkansas so that information could be gathered to assist line administrators in finding solutions to articulation problems.

II. PURPOSE

The purpose of this study was to examine and analyze data gathered relative to the articulation process between colleges in the state of Arkansas and develop from this some information that may aid in the decision-making as to the status of transfer students in areas of Physical Science and Mathematics. Specifically, the study should answer the following questions:

1. Do key agents of Arkansas colleges have similar views about admissions criteria?

2. Are there differences in the opinion of key agents of Arkansas colleges as to how transfer credits for Physical Science and Mathematics can be evaluated?

3. Is there general agreement among key agents of Arkansas colleges relative to the use of achievement tests, GPA, and previous performance for placement of transfer students?

4. What differences are there in the opinion of key agents of Arkansas colleges concerning joint planning for Physical Science and Mathematics course content?

5. Is there general agreement among key agents of Arkansas colleges as to how curriculum changes for Physical Science and Mathematics may be initiated?

6. Do key agents of Arkansas colleges generally agree on the composition of the body responsible for developing articulation procedures?

III. SIGNIFICANCE OF THE STUDY

An increase in the number of junior and community colleges has made higher education available to a much larger number of college-age youth and older adults. These colleges are seen as an instrument for diversifying educational opportunities, making it possible for those students with diversified characteristics to consider some form of higher education. Many of these students differ in academic ability, social and cultural backgrounds, attitudes, beliefs, values, and other basic characteristics of personality. Because of these differences, these colleges must adjust their programs to allow for this diversified group (Knoell and Medsker, 1965).

A large number of these students enter junior and community colleges with the intent to transfer to a four-year college or univeristy. Others decide on transference after adjusting to study in the junior or community college system. If the transfer of these students is to be smooth there must be agreements between the institutions involved. Each area of study has problems unique to it, and research is needed to find those factors which can make for an easier transfer.

IV. RESEARCH DESIGN AND PROCEDURE

This study examined and analyzed data collected through interviews and a survey instrument in the form of a questionnaire. The questionnaire

was based on Guidelines for Improving Articulation Between Junior and Senior Colleges developed by the Joint Committee on Junior and Senior Colleges. The responses from the questionnaire were arranged to formulate two by two tables from which chi-squares were calculated. The chi-square values were used to interpret differences between desired and current practices in the colleges and universities within the state of Arkansas. The purpose of this research was to provide information which may be useful in making an easier student transfer between the junior and senior colleges of Arkansas.

V. SOURCES OF DATA

Information for the study was provided by interviews with and questionnaires completed by key agents in each of the colleges and universities of the state of Arkansas. The data related primarily with issues relative to the transfer status of students in the areas of Physical Science and Mathematics. In addition to information gathered from questionnaires and interviews, college and university documents were examined for statements about admission procedures for transfer students.

VI. SELECTION OF INSTITUTIONS

There are thirty-two degree-awarding institutions within the state of Arkansas. Fourteen of these are junior and/or community colleges which only award associate degrees. The others award bachelor and/or higher degrees. All thirty-two of these institutions were used in the study.

VII. LIMITATIONS OF THE STUDY

In a descriptive comparative study such as this, it is important to realize that broad generalizations are not appropriate. This study interpreted the data to identify all similarities and differences used for determining the status of transfer students at the first and second levels with emphasis in the areas of Physical Science and Mathematics. It was not the purpose of this study to make value judgments on the merits of any one procedure or method for the articulation process; the report is as objective as possible. It was recognized that schools have differing philosophies and that these may govern certain practices in their articulation process. This study looked for commonalities that might enhance the articulation process.

VIII. DEFINITION OF TERMS

1. Articulation.

> (1) (Curric.) The organization of classroom instruction, co-curricular activities, and other interdependent and inter-related services of the school system so as to facilitate the continuous and efficient educational process of students from grade to grade and from school to school; also, interrelation of the school's instructional program with the educational programs of other available institutions or with work opportunities; (2) (Couns.) Communication and cooperation between two or more groups in developing their guidance programs so that quick and easy orientation of individuals shifting from one program to another is facilitated. (Good, 1973, p. 42)

2. Community college.

> A college typically set up to meet the educational needs of a particular community and offering 2-year training, either terminal or preparatory, in preprofessional and liberal arts fields. (Good, 1973, p. 114)

3. Junior college.

Generally a 2-year institution of higher learning. A question has been raised about whether it should be classified as an extension of secondary education or as a part of higher education; sometimes regarded as a "feeder" for 4-year colleges or universities. (Good, 1973, p. 321)

4. Key agents. As used in this study, refers to Academic Deans and Departmental Chairpersons.

5. Physical science.

Organized knowledge about physical composition and structure of natural phenomena; includes chemistry, physics, astronomy, geology, meterology, and the areas of specialization derived from these. (Payne, 1979, p. 9)

6. Senior college.

An institution of higher education which offers at least one baccalaureate degree.

In this study, universities will be considered in the same category as senior colleges.

IX. ORGANIZATION OF THE STUDY

This study has been organized into five chapters. Chapter I includes an introduction to the study, statement of the problem, the purpose of the study, significance of the study, a research design and procedures, limitations of the study, definitions of terms, and how the study is organized; Chapter II presents a review of the related literature; Chapter III describes the research design and procedures used in the study; Chapter IV presents and analyzes the data; and Chapter V summarizes the study and gives some conclusions and recommendations relative to the findings.

CHAPTER II

REVIEW OF RELATED LITERATURE AND RESEARCH

A review of the literature revealed the problems relating to articulation between junior and senior colleges were not new, but the process of finding solutions to many of the problems is slow and difficult. Perhaps a reason for such slow progress is included in the following paragraph:

> There are few educational issues which have given rise to less controversy in professional circles than that of articulation. However, the absence of controversy is not necessarily a good sign, it may simply reflect indifference and lack of information. It is quite possible that if several thousand educators were polled to name the major educational problems of our day, the mere mention of articulation would be rare indeed. Since apathy and ignorance are the biggest obstacles to progress in utilizing articulation criteria more efficiently, it is only natural that some reliable data be presented to alert, not only the professional, but the layman as well. (Blanchard, 1975, p. 1)

If we are to follow the trend of diversity in higher education we must address the area of articulation (Gross, 1976). Trivett, 1976, in his article "Articulation in Postsecondary Education," defines articulation as: the process which promotes continuous, efficient, forward progress of students through the educational system. . . . He further wrote . . . if articulation is functioning at its best the process of formal education is continuous, and student progress is not impeded by any organizational educational units.

Gross, 1976, expresses that higher education is moving toward the reform in learning ideas from preparing a person for life to preparing

a person for lifelong learning. The need for improved articulation with the acceptance of such an idea is stated by Trivett, "Articulation in Postsecondary Education," 1976:

> If we are gradually accepting the idea that contemporary society requires constant reeducation, and that the educational system should be further opened to adults who perceive the need to change and adapt them further improvements in articulation will be required so that learners of all ages move in and out of educational institutions in a smooth, efficient process. (Trivett, 1976, p. 3)

According to a report of the Carnegie Commission, 1973, we are in the phase of universal access to higher education with new constituencies of students. They are of varied backgrounds and from all academic ranks of high school, and the preparation of these students leads to many alternate channels. This brings on new roles for teachers. Teachers will become more of a mentor, advisor, consultant, or facilitator (Gross, 1976). Such roles will demand an attitude that puts the student first and the institution second. This means that more consideration will be given to the needs of students such as the transfer and award of academic credit, an important phase of the articulation process (Kintzer, 1976).

I. TRANSFER PATTERNS AND TRENDS

Many of the state and regional educational organizations have done both research and developmental work toward finding solutions to the articulation problems facing them in their institutions of higher education. In the South the Southern Regional Education Board (SREB) has developed a booklet which has information about fourteen states. The booklet, "2 + 2 = Expanded Opportunity," was compiled from a survey done

by SREB. This literature contains reports and documents with specifics about agreements between junior and senior colleges. The Southern Regional Education Board stated:

> The purpose of this report is to identify transfer agreements which are now operational or under study in a number of Southern States. Inquiries were sent to the state higher education agencies, both for senior institutions and for community colleges, in the fourteen SREB states. (SREB, 1979, p. 1)

The report revealed that these states had over fifty types of coordinated programs through which students might move from community colleges into senior institutions in technical and career-oriented fields.

The South Carolina Postsecondary Education Planning Commission published a document in May 1977 which was the results of the analyzation of thirty-one senior colleges. The report listed criteria given by these thirty-two senior colleges for students transferring from two-year colleges. This document stated that the information was intended as an aid to students, counselors, and faculty members of two-year colleges (South Carolina Postsecondary Education Planning Commission, 1977). An examination of several articles revealed the many changes affecting the articulation process. Knoell and Medsker, 1965, stated:

> The lack of extensive statewide activity in articulation has been a reflection of two sets of circumstances. First, the four-year colleges have had a long history of articulation activities and programs involving the high schools from which they draw their freshmen. Attention has been focused on high school relations for so long that the colleges find it difficult to readjust their thinking and programs to the needs of the transfer students. (Knoell and Medsker, 1965, p. 73)

Frederick C. Kintzer, 1976, stated:

> working together in formal and informal ways, state officials and postsecondary institutions across the country have done much in recent years to facilitate the transfer of academic credit

> between two- and four-year colleges and universities. The increased flexibility has enhanced the educational opportunities of students beyond high school, and it has also revealed some creative approaches to statewide policy making and coordination.
>
> "Articulation" is the term used frequently to describe this kind of cooperation. In the case of credit transfer, articulation among institutions includes the development of common policies, guidelines, procedures and working agreements. Equally important, there have been efforts to increase articulation between institutions and state governments so that the proper balance between control and autonomy can be reached in statewide coordination. (Kintzer, 1976, p. 13)

In answer to the cries of those who pioneered in articulation, many states have devised and implemented studies. California has been the focal point for many of these studies. Its system of junior colleges causes it to be a leader in finding solutions to problems in articulation. Kintzer, 1976, summarized the California situation:

> Articulation in California is coordinated by the state's "Articulation Conference," made up of representatives of education, both public and private, and government. The leadership of the Conference is concerned that its volunteer membership and cooperation will give way to official policy controls. The University of California continues to accept community college courses on an equivalent or similar basis. The state university and college system will accept the entire 40-unit minimum of credit from any regionally accredited college when so certified by the president or his delegated representative. A transfer credit review board with equal membership of the state university and colleges and the California community colleges has been established to receive student complaints. (Kintzer, 1976, p. 14)

An unpublished paper, "The Role and Function of the California Journalism Articulation Committee," was the results of a study conducted by S. Ames.

Agnes Martinko, under the direction of the Pennsylvania State Department of Education, did an analysis of student transfers from community colleges. She found that in a period of five years the data

collected showed an increase from 2,457 community college transfers in 1970 to 4,278 in 1975. Martinko made the following recommendations from the study:

> 1. There needs to be a system of reporting between the transmitting and receiving institutions so that community colleges can effectively follow their graduates, define the articulation difficulties and establish dialogue with receiving institutions so that the credit, time and financial loss to the students is minimized.
> 2. The reasons for institutional choice should be determined for both first-time and transferring students. This information is necessary for planning and for establishing a foundation for making assumptions about various trends.
> 3. A future study should focus on the articulation difficulties associated with the type of degree awarded, i.e. associate of arts, associate of science and associate of applied science.
> 4. The migration trend of the community college transfers to the four-year institutions has been fairly well established by data from the five-year analysis. Unless the number of transfers change substantially, an annual analysis is not necessary. (Martinko, 1976, p. 16)

II. TRANSFER POLICIES

The state of Maryland's Council for Higher Education published a document which contained student transfer policies. This document made use of the guidelines as listed by the Joint Committee on Junior and Senior Colleges in Guidelines for Improving Articulation Between Junior and Senior Colleges. The document contains fourteen policy statements. The fourteenth statement gave a summary of the policies:

> The state of Maryland should support four-year institutions so that all students in an articulated transfer program who are awarded an Associate-in-Arts degree from a public community college shall be admitted with full junior standing to a public four-year institution, unless either the number of students desiring admission exceeds the number that can be accommodated in a particular professional or specialized program or certain circumstances exist which require a limitation being placed on the size of junior programs. In such instances, admission

> will be based on criteria developed by the receiving institution to select the best qualified students. (Maryland Council for Higher Education, 1975, p. 5)

The policies of South Carolina senior colleges and universities concerning transfer of students from two-year colleges was the results of a study conducted by the South Carolina Postsecondary Education Planning Commission. The document presented individual responses from thirty-one South Carolina senior colleges and universities to a questionnaire on transfer policies. The questions covered admissions, housing, and academic policies.

The University of Washington developed a community college transfer program and published the results in 1966. The report divided the articulation statement into three parts: (1) General information about the University of Washington which included admissions criteria and procedures, transfer policies, and student aid; (2) Programs and course requirements for each of the University's colleges, schools, interdepartmental programs, and departmental curriculums; and (3) A list of courses for each community college within the state for which parallel evaluations had been completed and for which direct transfer credit would be given. Each community college course was listed with its university parallel (University of Washington Community College Transfer Programs, 1966).

The Virginia Department of Community Colleges supported Charles A. Houston and Robert W. Boyer in a study of the mathematics curriculum of the community colleges of Virginia. The report correlated college transfer mathematics courses in Virginia Community Colleges with parallel courses in thirteen state four-year colleges and universities. Data were

collected by examining four-year college catalogues and correlating this with course descriptions in the Virginia community college curriculum guidelines. They surveyed mathematics department chairpersons to validate the correlations. The introduction of this report stated:

> In a recent publication of the state council for Higher Education in Virginia, Winsely and Schultz asserted that "it now appears that the success of higher education services in Virginia depends as much on a student's ability to move from one college to another as upon his opportunity to gain admission as a college freshman." While this may be a slight exaggeration, it nevertheless, indicates the need for continuous curricula articulation between the community colleges and senior institutions in Virginia. (Houston, 1975, p. 6)

Iowa was the recipient of a College Science Improvement Program (COSIP) grant in 1968 to study ways to provide better articulation between two-year and four-year colleges. One segment of this study was under the direction of Dr. R. J. Vanden Branden of Drake University and another segment under the direction of Dr. Bob Hanson, the Executive-Secretary of the Iowa Academy of Science (University of Northern Iowa). Dr. Vanden Branden looked at biology and Dr. Hanson at chemistry. A summary of conclusions from a report by Vanden Branden reads:

> 1. Direct contact and face-to-face discussions with the four-year college and other two-year college peers is the most effective means of communication.
> 2. There is a need for "on site" visits to both the two-year and four-year institutions. A rating scale is helpful in weighing strengths and weaknesses of the visitor's program and facilities.
> 3. Discussions with working faculty within the visitor's discipline and in related disciplines is needed and desirable but it is recognized that administrators and admissions counselors must be included for effective results.
> 4. Feedback from students who have transferred from two-year schools is needed to confirm reports from other sources concerning the effectiveness of preparatory courses and acceptance of transfer credits.
> 5. Top priority should be given to the writing of objectives, including content, attitudinal, and behavioral objectives, for

> each course offered in college. This has been identified as the most effective method to produce courses and programs which will be equivalent at the two-year and four-year college level. (Vanden Branden, 1972, p. 8)

The Tennessee Association for Colleges of Teacher Education, at a meeting in the Spring of 1979, drafted a proposed articulation agreement between public community colleges and public universities in Tennessee. This document contained fifteen guidelines which covered aspects of the counseling services, admission requirements, orientation, and course credits. There were places for the appropriate administrators to sign this agreement (Tennessee Association for Colleges of Teacher Education, 1979). Departments of Education seem to be the prime initiators of the articulation process in institutions of higher education, but current trends suggest that eventually all components of higher education will give some consideration to the problems of articulation.

Several articles have information relating to what may improve the articulation process. Julius Menacker in a paper, "Two-Year and Four-Year College Curricular Articulation," stated:

> There are few curricular articulation problems that cannot be solved, or at least improved, through the simple remedy of having academic colleagues meet together, provided that they are agreed that the purpose of mutual deliberation is to improve the transition of community college transfers rather than to defend the rationalization of perogatives of either group. (Menacker, 1974, p. 203)

Richard Rinehart in an article, "Assessing Articulation of Transfer Students," wrote:

> Recommendations stress the overriding importance of extensive communications between the two-year and four-year colleges, and the need for joint involvement in establishing articulation assessment criteria. These needs come up in almost every meeting, conference, or publication dealing with transfers. Advising and admission decisions require multiple channels of

> communication because of the changing status of curricular expectations at both colleges, and changes of personnel. Articulation offices are needed in all colleges that include sizeable numbers of transfer students in their student bodies. These offices must be able, through capacity and contract, to monitor and facilitate mutual communications about faculty, admissions, counseling, and financial aid. (Rinehart, 1977, p. 45)

III. ACCREDITATION: PURPOSES AND RESULTS

The organizations of (1) Council on Postsecondary Accreditation, (2) The American Council on Educational Commission on Education Credit, and (3) The Executive Committee, American Association of Collegiate Registrars and Admissions Officers, formulated a "Joint Statement on Transfer and Award of Academic Credit" in which they site three considerations:

> 1. The educational quality of the institution from which the student transfers;
> 2. The comparability of the nature, content, and level of credit earned to that offered by the receiving institutions; and
> 3. The appropriateness and applicability of the credit earned to the programs offered by the receiving institution, in light of the student's educational goals. (American Association of Collegiate Registrars and Admissions Officers, 1978, p. 1)

This group also made the following statement about the importance of awarding academic credit:

> It is important for reasons of social equity and educational effectiveness, as well as the wise use of resources, for all institutions to develop reasonable and definitive policies and procedures for acceptance of transfer credit. (AACRAO, 1978, p. 1)

They further suggested that the accreditation of institutions by an accreditation agency affords reason for confidence in an institution

and/or its programs. This implied that students from such institutions have met acceptable standards of educational accomplishment.

The validity of the idea as expressed by the Joint Committee of the American Association of Collegiate Registrars and Admissions Officers that accreditation may be used as an evaluative factor for transfer credit is expressed by Blauch:

> A second purpose of accrediting is to facilitate the transfer of students from one institution to another. Such transfer is rather extensive. Some of it is horizontal, students transferring from one level in an institution to the same level in another, but most of it is vertical, students completing courses of study in an institution and then moving to other institutions for more advanced or professional study. (Blauch, 1959, p. 4)

The first purpose of accreditation was the recognition accorded an institution which meets the criteria or standards established by a competent agency or association.

IV. PROCESSES FOR CHANGE

Cloud and Rodriguez in a January 1979 article wrote about an idea called the upper-division concept. This upper-division university was designed to complement the work of the community colleges. They concentrated on junior, senior, and graduate curricula intended to meet the needs of the community college transfer student by insuring smoother articulation and reducing duplication of effort. The article listed several advantages of upper-division universities which benefit transfer students:

> 1. The faculty and administration are positively oriented toward transfer students.

2. Upper-division institutions are teaching oriented in the same manner as community colleges; research does occur, but it is secondary to the teaching/learning process.
3. Students are admitted to upper-division institutions with minimum loss of academic credit, time and money.
4. Upper-division institutions offer specialized concentration in baccalaureate and graduate education and thus serve as a means of direct entry into occupations.
5. Instruction and student services are tailored specifically for the convenience of the transfer student.
6. At the upper-division institution every entering student has previously earned credits at another college or university. There is no competition with students who have already been on campus for two or more years. (Cloud, 1979, p. 393)

Frederick C. Kintzer wrote an epilogue in an article in 1976, "Articulation and Transfer," which still fits the situation in 1980:

> As higher education systems, both public and private, determine to improve articulation and transfer relationships, the fundamental question is: What policy and procedural changes are necessary to better accommodate the needs of students who wish to transfer from one institution to another? Other questions must also be addressed:
>
> 1. What policy and procedural adjustments are referred to place the transfer student on an equitable basis with the native student?
> 2. What are the roles of state government and regional, state, and federal agencies in achieving such equitability?
> 3. What are the roles of specialized associations and organizations?
> 4. What responsibilities should be retained by the institutions?
> 5. What techniques can be adopted by sending and receiving institutions to assure the itinerant student full information concerning the articulation and transfer process, and help him in understanding the environment in which he hopes to study?
> 6. How can competencies other than academic ability be realistically measured, evaluated, and translated into credit systems?
> 7. What routes to degrees and certificates are worthy of serious consideration?
> 8. How can improvements in interinstitutional and interstate cooperation be accomplished?
>
> The education profession is under heavy pressure to establish uniform equal access and opportunity to allow students to pursue individual goals in higher education. The transfer ranks high on the list of student types least adequately accommodated. The

> point of view taken here is that professional educators employed by institutions are best able to determine how to make such improvements. While statewide guidelines and state agencies are necessary for direction and continuity, authority for policy determination and implementation should remain with institutions. An articulation agreement should be developed as a joint venture involving wide participation of educators and non-educators in good faith, cooperation among planners of the pact, and ultimately the understanding and support of those who work directly with students. (Kintzer, 1976, pp. 40-41)

IV. SUMMARY

An overview of the literature and research relating to articulation between junior and senior colleges support the following generalizations:

1. Institutions of higher education are giving more emphasis to the problems which occur when students transfer from one college to another, and many have developed systems for aiding the process.

2. Past research has not concentrated on specific areas such as Physical Science and Mathematics. There seems to be a need for more data on the articulation process as it relates to specific disciplines.

3. Professional organizations related to higher education are doing research in the area of articulation and have data available for aiding those directly involved in the process.

4. While articulation between junior and senior colleges has progressed in the last few years, much remains to be done if higher education is to meet its challenge to provide educational opportunities for the total population seeking educational improvement.

CHAPTER III

RESEARCH DESIGN AND PROCEDURE

The cooperation and communication needed for a smooth transition as students move from a junior college to a senior college require the involvement and attention of students and school personnel in a variety of academic settings. The problems associated with this process have been and still are the concern of several studies and organizations of higher education. This study looked at factors which are associated with the articulation practices. The focus of this study was on the state of Arkansas.

I. SOURCES AND COLLECTION OF DATA

The study examined and analyzed data collected relative to articulation practices in the colleges and universities of the state of Arkansas. The state has eighteen senior colleges and universities, of which eight are private and the other ten are publicly supported. Two of the fourteen junior and/or community colleges are private. Because of its special focus, the University of Arkansas School of Medical Sciences was not included in the eighteen senior colleges. Catalogs of the thirty-two schools used in the study were examined for statements related to articulation practices as background information for the questionnaire employed in the study.

The survey was used because of the major emphasis in the research on articulation practices as they relate to the areas of Physical Science and Mathematics.

> . . . a survey is primarily the way in which an educator answers the "what exists?" type of question. (Cook, 1965, p. 42)

A copy of the questionnaire was mailed, with a letter of explanation and a return envelope, to each of the key agents of the schools used in the study. Follow-up telephone calls were made to several of the schools in order to secure returns. Information from key agents of two groups—senior colleges and/or universities and junior and/or community colleges—was examined and analyzed.

II. PARTICIPATING INSTITUTIONS

The following colleges and/or universities were participants in the study:

Group I: Senior Colleges and Universities

Arkansas Baptist College

Arkansas College

Arkansas Polytechnic College

Arkansas State University

Central Baptist College

College of the Ozarks

Harding College

Henderson State University

Hendrix College

John Brown University

Ouachita Baptist University

Philander Smith College

Southern Arkansas University

University of Arkansas at Fayetteville

University of Arkansas at Little Rock

University of Arkansas at Monticello

University of Arkansas at Pine Bluff

University of Central Arkansas.

Group II: Junior and/or Community Colleges

American College of Commerce

Arkansas State University, Beebe Branch

Capital City Business College

Crowley's Ridge College

East Arkansas Community College

Garland County Community College

Mississippi County Community College

North Arkansas Community College

Phillips County Community College

Shorter College

Southern Arkansas University, El Dorado

Southern Arkansas University Technical Institute

Southern Baptist College

Westark Community College.

III. INSTRUMENTATION

The instrument used was a questionnaire adapted and developed from the Guidelines for Articulation Between Junior and Senior Colleges. This instrument was designed to determine the degree of perceptual congruence within each group of key agents. Likert-type scale statements were developed to assess the 1980 status of articulation between junior and senior colleges in Arkansas; to secure information relative to the degree of communication between the two types of colleges concerning Physical Sciences and Mathematics credits; to show the relation between and among key agents as to their perception of the articulation status, 1980, between Arkansas junior and senior colleges; and to gain information about the desirability of certain principles of articulation as suggested by the Guidelines of the Joint Committee on Junior and Senior Colleges from key agents of Arkansas colleges:

> The major purpose of the Guidelines is to provide a framework within which junior and senior colleges, singly and cooperatively, can develop specific policies governing transfer between and among institutions. The Guidelines are not intended to be as substitutes for local and state policies, but instead, a set of principles against which the appropriateness of particular policies can be tested. (Joint Committee on Junior and Senior Colleges, p. 5)

The questionnaire, composed of sixty-one items, was divided into five parts: (1) Admissions for Physical Science and Mathematics, (2) Evaluation of Transfer Courses for Physical Science and Mathematics, (3) Curriculum Planning for Physical Science and Mathematics, (4) Articulation Programs for Physical Science and Mathematics, and (5) Evaluation for Physical Science and Mathematics. Two responses were requested on each statement. First, respondents were asked to indicate on a five-point

scale their opinion as to the practice at their institution (actual role) and, secondly, to indicate what they considered as desired practice (ideal role). The response categories were defined as follows:

Current Practice

5—Yes	Statement is customarily followed.
4—Probably	Statement is followed under most circumstances.
3—Seldom	Statement is inconsistent with school practices under most circumstances.
2—No	Statement is definitely not followed.
1—Uncertain	Respondent is undecided as to whether statement is followed.

Desired Practice

5—Yes	Statement is definitely desirable.
4—Probably	Statement is desirable under most circumstances.
3—Seldom	Statement is not desirable under most circumstances.
2—No	Statement is definitely not desirable.
1—Uncertain	Undecided as to desirability of statement.

IV. TREATMENT OF DATA

Responses on the Likert-type scale were tabulated by respondent groups and recorded in raw scores for each item on the instrument. A table was constructed showing all categories and the responses. The tables show responses, totals, a chi-square for each group, and a contingency coefficient for each group. Each table was grouped according to institutional level—Senior College, Junior College, and All Colleges.

In a discussion with a research design specialist, it was suggested that chi-square be used as a major descriptive measure. A chi-square was calculated for each set of scores using a fourfold table with Desired Practice (A), Current Practice (B), Yes (C), and Not Yes (D) as frequency cells. The contingency table setup was:

A	B	A + B
C	D	C + D
A + C	B + D	

The equation for computing chi-square was:

$$\text{chi-square} = \frac{N\ (BC - AD)^2}{(A + B)\ (C + D)\ (B + D)\ (A + C)}$$

The chi-square was then used as a means for testing the significant difference between Desired and Current Practices. Since chi-square does not give information about the degree of difference, a contingency coefficient was calculated for each chi-square for this purpose.

> . . . contingency coefficients have a decided advantage over other measures of relationship; no assumptions involving the nature of the variables need be met—continuous or discrete variables, normal or skewed or any shaped distributions for underlying traits, ordered or unordered series, and combinations thereof are permissible. (McNemar, 1969, p. 230)

The equation used for calculating the contingency coefficient was:

$$C = \left(\frac{X^2}{N + X^2} \right)^{1/2}$$

These two measures were then used for analyzing each item. The chi-square was used at a 0.05 level of significance for the null hypothesis. The

contingency coefficient was used to give some reasonable feel of the degree of difference where chi-square suggested existing differences. For a fourfold table, the upper limit of the contingency coefficient is equivalent to $(1/2)^{1/2}$ or 0.707.

CHAPTER IV

ANALYSIS OF DATA

Dividing the questionnaire into five parts made it convenient to generalize some of the issues as seen by the Joint Committee in their Guidelines for Improving Articulation Between Junior and Senior Colleges. Each issue is important for any total articulation program.

Responses were received from all of the thirty-two institutions. Seventy-five percent of the questionnaires sent to senior colleges were returned, while 84 percent of those sent to junior colleges were returned. One-half of the Arkansas colleges had enrollments of less than 1,000 students. This group was made up of seven senior colleges and nine junior colleges. One senior college had less than 900 students, two had more than 600 students but less than 800, two had more than 500 students but less than 600, and two had less than 500 students.

Two junior colleges had less than 900 students but more than 500, five had more than 300 but less than 500, and two had less than 300 students. In many of the smaller schools, one individual performed several functions; consequently, the smaller schools had fewer key agents than the larger schools.

The five parts of the questionnaire were divided into specific sets of statements relative to the articulation areas found in the Guidelines for Articulation Between Junior and Senior Colleges. Each item is summarized in a table whose title is the complete statement as used in

the questionnaire. A chi-square measure was used for finding differences between desired practices and current practices. Contingency coefficients were then calculated to determine the degree of difference.

I. ADMISSIONS FOR PHYSICAL SCIENCE AND MATHEMATICS

This section contained eleven statements relating to transfer credits, academic counseling, academic performance, use of achievement tests and GPA for admission, and the value of an associate degree as a criteria for admission.

Table 1 is a summary of responses to the statement, "Public four-year colleges and universities should accept a transfer with an overall C average." The concern here is whether four-year colleges and universities should use other criteria in addition to a "C" average for admitting transfer students. Table 1 shows a chi-square of 1.100 and a contingency coefficient of 0.156 for the senior colleges. These values indicated no significant differences in the opinion of key agents of senior colleges. A chi-square of 0.580 and a contingency coefficient of 0.134 indicated that there were very little, if any, differences in the opinion of key agents at the junior college level in response to this statement. Table 1 calculations yielded zeroes for both chi-square and contingency coefficient when the college groups were combined. This indicated no significant difference between the two groups.

Table 2 is a summary of responses to the statement, "Transfer students who have relatively poor performance in areas of Mathematics and Physical Science should have special academic counseling." The question here is whether efforts should be greatly intensified to counsel

TABLE 1

PUBLIC FOUR-YEAR COLLEGES AND UNIVERSITIES SHOULD ACCEPT A TRANSFER STUDENT WITH AN OVERALL C AVERAGE

Responses	Senior Colleges[a]		Junior Colleges		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	19	21	12	10	31	31
Probably	3	1	3	5	6	6
Seldom	0	0	0	0	0	0
No	0	0	0	0	0	0
Uncertain	0	0	1	1	1	1
TOTAL	22	22	16	16	38	38
Chi-Square = 1.100			0.580		0	
Contingency Coefficient = 0.156			0.134		0	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 2

TRANSFER STUDENTS WHO HAVE RELATIVELY POOR PERFORMANCE IN AREAS OF MATHEMATICS AND PHYSICAL SCIENCE SHOULD HAVE SPECIAL ACADEMIC COUNSELING

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	19	9	8	2	27	11
Probably	3	7	8	10	11	17
Seldom	0	2	0	3	0	5
No	0	3	0	1	0	4
Uncertain	0	1	0	0	0	1
TOTAL	22	22	16	16	38	38
Chi-Square =	9.82		5.24		13.474	
Contingency Coefficient =	0.427		0.375		0.388	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice

P = 0.05.

students who qualify but show some chance of failure. The calculations for senior colleges yielded a chi-square value of 9.82, indicating a probability of less than 0.01 of a chance difference. There were differences in the opinion of key agents of senior colleges on this statement. The contingency coefficient of 0.427 revealed a degree of difference that was substantial, since the maximum limit of a contingency coefficient for a fourfold table is 0.707.

The chi-square value for the junior colleges of 5.24 showed differences in the opinion of key agents of junior colleges on this statement, and the value of 0.375 for the contingency coefficient showed a moderate degree of difference. The chi-square value of 13.474 for the combined responses strongly indicated differences of opinion among the key agents of both senior colleges and junior colleges. The contingency coefficient value of 0.388 indicated a moderately high degree of difference.

Table 3 is a summary of responses to the statement, "More uniform procedures should be used in the counseling of prospective students." The chi-square value of 15.395 gave reasonable assurance that key agents of senior colleges showed differences of opinion on this question. A contingency coefficient of 0.509 indicated a relatively strong degree of difference. The chi-square value for the junior colleges of 3.865 indicated differences of opinion among key agents relative to this statement. The contingency coefficient of 0.328 showed a low degree of difference. The chi-square for all colleges of 17.488 gave reasonable assurance of a significant difference. The contingency coefficient of 0.561 showed that a significant difference was valid.

TABLE 3

MORE UNIFORM PROCEDURES SHOULD BE USED IN THE COUNSELING OF PROSPECTIVE STUDENTS

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges[a]	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	18	5	7	2	25	7
Probably	0	12	8	14	8	26
Seldom	1	2	1	0	2	2
No	3	2	0	0	3	2
Uncertain	0	1	0	0	0	1
TOTAL	22	22	16	16	38	38
Chi-Square =	15.395		3.865		17.488	
Contingency Coefficient =	0.509		0.328		0.561	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

Table 4 is a summary of the responses to the statement, "Academic performance in a junior and/or community college is the best single predictor of success in a four-year institution and should count most heavily in the admissions decisions." The zero values for both chi-square and the contingency coefficient gave reasonable confidence that there were no significant differences in the opinion of key agents in senior colleges for this statement. The chi-square value of 3.865 indicated that there were some differences in the opinion of key agents of junior colleges on this statement. The contingency coefficient of 0.328 showed a low degree of difference. A chi-square value of 1.645 showed no significant difference for all colleges, and the contingency coefficient of 0.204 also indicated no significant difference.

Table 5 is a summary of the responses to the statement, "Students previously denied admission to a senior college due to low grades in high school should be allowed to transfer to senior college upon satisfactory performance in junior and/or community college." A chi-square value of 0.419 revealed no significant differences in the opinion of key agents of senior colleges. A contingency coefficient of 0.137 supported the idea of no significant difference. The junior colleges' chi-square value of 8.960 showed significant differences in the opinion of the key agents, and the contingency coefficient of 0.467 revealed a relatively strong degree of difference. A chi-square of 5.329 gave evidence of significant differences in the opinion of key agents of all colleges. A contingency coefficient of 0.256 did not support this idea.

Table 6 is a summary of the responses to the statement, "A specific GPA in the areas of Physical Science and Mathematics is expected for

TABLE 4

ACADEMIC PERFORMANCE IN A JUNIOR AND/OR COMMUNITY COLLEGE IS THE BEST SINGLE PREDICTOR OF SUCCESS IN A FOUR-YEAR INSTITUTION AND SHOULD COUNT MOST HEAVILY IN THE ADMISSIONS DECISIONS

Responses	Senior Colleges		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	6	6	7	2	13	8
Probably	11	7	8	14	19	21
Seldom	1	5	1	0	2	5
No	3	3	0	0	3	3
Uncertain	1	1	0	0	1	1
TOTAL	22	22	16	16	38	38
Chi-Square = 0			3.865		1.645	
Contingency Coefficient = 0			0.328		0.204	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 5

STUDENTS PREVIOUSLY DENIED ADMISSION TO A SENIOR COLLEGE DUE TO LOW GRADES IN HIGH SCHOOL SHOULD BE ALLOWED TO TRANSFER TO SENIOR COLLEGE UPON SATISFACTORY PERFORMANCE IN JUNIOR AND/OR COMMUNITY COLLEGE

Responses	Senior Colleges		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	16	14	16	9	32	23
Probably	4	6	0	6	4	12
Seldom	1	1	0	0	1	1
No	0	0	0	0	0	0
Uncertain	1	1	0	1	1	2
TOTAL	22	22	16	16	38	38
Chi-Square =	0.419		8.960		5.329	
Contingency Coefficient =	0.137		0.467		0.256	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 6

A SPECIFIC GPA IN THE AREAS OF PHYSICAL SCIENCE AND MATHEMATICS IS EXPECTED FOR STUDENTS TRANSFERRING WITH UPPER DIVISION STANDING

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges[a]	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	2	2	4	2	6	4
Probably	10	4	6	3	16	7
Seldom	4	6	2	5	6	11
No	5	8	2	3	7	11
Uncertain	1	2	2	3	3	5
TOTAL	22	22	16	16	38	38
Chi-Square = 0			0.820		0.461	
Contingency Coefficient = 0			0.158		0.109	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

students transferring with upper division standing." A chi-square and contingency coefficient of zero values indicated no significant differences in the opinion of key agents of senior colleges for this statement. A chi-square value of 0.820 indicated no significant differences of opinion among key agents of junior colleges, and a contingency coefficient of 0.158 supported the idea of no significant difference. The value of 0.416 for chi-square and 0.109 for the contingency coefficient indicated no significant difference for all colleges.

Table 7 is a summary of the responses to the statement, "A specific number of credits in Physical Science and Mathematics must be required for transfer students to be admitted to upper division standing." The chi-square value of 0.518 indicated no significant differences of opinion among key agents of senior colleges, as did the contingency coefficient of 0.108. The chi-square of 1.129 for junior colleges showed no significant differences of opinion among key agents, and the 0.184 value for the contingency coefficient supported the idea of a no significant difference. Values of 1.490 for the chi-square and 0.139 for the contingency coefficient revealed no significant differences of opinion among key agents of all colleges.

Table 8 is a summary of the responses to the statement, "Aptitude and achievement test scores would be useful to counselors and faculty advisors in assisting transfer students to make wise decisions about programs." The senior colleges' data yielded a value of 0.820 for chi-square which indicated no significant differences of opinion among key agents. The 0.135 value for the contingency coefficient supported the idea of no significant difference. A value of 1.129 for chi-square for

TABLE 7

A SPECIFIC NUMBER OF CREDITS IN PHYSICAL SCIENCE AND MATHEMATICS MUST BE REQUIRED FOR TRANSFER STUDENTS TO BE ADMITTED TO UPPER DIVISION STANDING

Responses	Senior Colleges[a]		Junior Colleges		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	6	4	9	6	15	10
Probably	2	1	4	3	6	4
Seldom	5	5	0	2	5	7
No	8	11	1	0	9	11
Uncertain	1	1	2	5	3	6
TOTAL	22	22	16	16	38	38
Chi-Square =	0.518		1.129		1.490	
Contingency Coefficient =	0.108		0.184		0.139	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 8

APTITUDE AND ACHIEVEMENT TEST SCORES WOULD BE USEFUL TO COUNSELORS AND FACULTY ADVISORS IN ASSISTING TRANSFER STUDENTS TO MAKE WISE DECISIONS ABOUT PROGRAMS

Responses	Senior Colleges		Junior Colleges		All Colleges	
	D.P.[a]	C.P.[b]	D.P.[a]	C.P.[b]	D.P.[a]	C.P.[b]
Yes	12	9	9	6	21	15
Probably	6	6	4	3	10	9
Seldom	4	5	0	2	4	7
No	0	0	1	0	1	0
Uncertain	0	2	2	5	2	7
TOTAL	22	22	16	16	38	38
Chi-Square =	0.820		1.129		1.900	
Contingency Coefficient =	0.135		0.184		0.156	

[a]Desired Practice.

[b]Current Practice.

P = 0.05.

junior colleges showed no significant difference. A contingency coefficient value of 0.184 supported the idea of no significant difference. For all colleges, a chi-square value of 1.900 gave evidence of no significant difference, as did the contingency coefficient value of 0.156.

Table 9 is a summary of the responses to the statement, "Junior and/or community college students should complete their program before transfer." A chi-square of 2.444 gave reasonable assurance of no significant differences of opinion among key agents of the senior colleges, and the 0.229 value for the contingency coefficient supported the no significant difference idea. The chi-square value of 1.391 for junior colleges indicated no significant difference. The 0.204 value for the contingency coefficient also indicated no significant difference. The values of 0.075 for chi-square and 0.031 for the contingency coefficient showed no significant differences of opinion among key agents of all colleges.

Table 10 contains data from responses to the statement, "The requirement of an Associate Degree as a condition for transfer appears to unduly restrict the mobility of good students between junior and/or community and senior colleges." The senior colleges yielded a chi-square value of 0.093 which indicated no significant differences of opinion among key agents. The contingency coefficient value of 0.045 supported the no significant difference idea. The junior colleges yielded 0.125 as a chi-square value which indicated no significant differences of opinion among key agents. The contingency coefficient value of 0.062 supported this idea. The data of all colleges yielded zero values for both chi-square and the contingency coefficient. This gave evidence of no significant differences of opinion among all key agents for this statement.

TABLE 9

JUNIOR AND/OR COMMUNITY COLLEGE STUDENTS SHOULD COMPLETE THEIR PROGRAM BEFORE TRANSFER

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	2	6	6	3	8	9
Probably	6	5	7	10	13	15
Seldom	4	9	1	0	5	9
No	9	0	2	2	11	2
Uncertain	1	2	0	1	1	3
TOTAL	22	22	16	16	38	38
Chi-Square =	2.444		1.391		0.075	
Contingency Coefficient =	0.229		0.204		0.031	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05

TABLE 10

THE REQUIREMENT OF AN ASSOCIATE DEGREE AS A CONDITION FOR TRANSFER APPEARS TO UNDULY RESTRICT THE MOBILITY OF GOOD STUDENTS BETWEEN JUNIOR AND/OR COMMUNITY AND SENIOR COLLEGES

Responses	Senior Colleges		Junior Colleges		All Colleges	
	D.P.[a]	C.P.[b]	D.P.[a]	C.P.[b]	D.P.[a]	C.P.[b]
Yes	10	9	8	9	18	18
Probably	3	2	2	4	5	6
Seldom	3	6	5	2	8	8
No	5	4	1	1	6	5
Uncertain	1	1	0	0	1	1
TOTAL	22	22	16	16	38	38
Chi-Square =	0.093		0.125		0	
Contingency Coefficient =	0.045		0.062		0	

[a]Desired Practice.

[b]Current Practice.

P = 0.05.

Table 11 contains the results of responses to the statement, "Transfer applicants from unaccredited junior and/or community colleges should be admitted on the same basis as applicants from regionally accredited colleges until such time as regular accreditation has been achieved." The zero value for chi-square and for the contingency coefficient indicated that there were no significant differences of opinion among key agents of senior colleges. The chi-square value of 1.391 for junior colleges also supported the idea of no significant difference, as did a contingency coefficient of 0.204. A value of 0.957 for chi-square for all colleges indicated that there were no significant differences of opinion among the key agents of Arkansas colleges. The contingency coefficient value of 0.112 supported the idea of no significant difference.

The section on Admissions contained eleven statements. The contingency coefficients and the chi-square values for questions two and three indicated significant differences of opinion among key agents for junior colleges. A consistent pattern emerged from the chi-square and contingency coefficient values. This pattern indicated no significant differences of opinion among key agents of Arkansas colleges for desired practices and current practices.

Table 12 presents data for the combination of all responses under the area of Admissions. In the senior college responses, a chi-square value of 5.347 calculated from the data indicated significant differences of opinion among key agents of senior colleges, but the contingency coefficient of 0.147 revealed no significant difference.

TABLE 11

TRANSFER APPLICANTS FROM UNACCREDITED JUNIOR AND/OR COMMUNITY COLLEGES SHOULD BE ADMITTED ON THE SAME BASIS AS APPLICANTS FROM REGIONALLY ACCREDITED COLLEGES UNTIL SUCH TIME AS REGULAR ACCREDITATION HAS BEEN ACHIEVED

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges[a]	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	1	1	6	3	7	4
Probably	7	7	7	8	14	15
Seldom	2	2	0	1	2	3
No	11	10	2	4	13	14
Uncertain	1	2	1	0	2	2
TOTAL	22	22	16	16	38	38
Chi-Square = 0			1.391		0.957	
Contingency Coefficient = 0			0.204		0.112	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 12

SUMMARY TABLE FOR ADMISSIONS FOR PHYSICAL SCIENCE AND MATHEMATICS

Responses	Senior Colleges		Junior Colleges		All Colleges	
	D.P.[a]	C.P.[b]	D.P.[a]	C.P.[b]	D.P.[a]	C.P.[b]
Yes	111	86	92	54	203	140
Probably	55	58	57	80	112	138
Seldom	25	43	10	15	35	58
No	44	41	9	11	53	52
Uncertain	7	14	8	16	15	30
TOTAL	242	242	176	176	418	418
Chi-Square =	5.347		16.852		19.659	
Contingency Coefficient =	0.147		0.214		0.152	

[a]Desired Practice.

[b]Current Practice.

P = 0.05.

The junior colleges' data yielded a chi-square value of 16.852 which showed significant differences of opinion among key agents of junior and/or community colleges. While the chi-square value indicated a significant difference, a contingency coefficient of 0.214 revealed no significant difference. The chi-square value of 19.659 calculated from the combined responses for all colleges gave evidence of significant differences of opinion among key agents, but a contingency coefficient of 0.152 indicated no significant difference.

Singly, the calculations, as indicated by the values in each table, showed only two questions out of eleven indicating significant differences for senior colleges and four out of eleven for junior colleges. Generally, there were no significant differences among the responses of those participating. The calculations for the combined responses, however, revealed some degree of difference.

II. EVALUATION OF TRANSFER COURSES FOR PHYSICAL SCIENCE AND MATHEMATICS

The following issues were addressed in this section:

1. What is the major purpose of evaluating junior college courses presented by transfer students?

2. What can the receiving institution do to best serve this purpose?

3. How much credit should senior colleges accept from junior colleges?

4. On what grounds can a particular amount be defended?

Table 13 contains data for responses to the statement, "Potential transfer students should be informed as to the precise evaluation of their application as soon as possible within a period of 15 days after receipt of application." The chi-square value of 3.771 was just under the value for an 0.05 level. There were no significant differences of opinion among key agents of senior colleges. The value of 0.281 for the contingency coefficient also indicated no significant difference.

The calculations yielded a 1.129 value for chi-square and 0.185 for the contingency coefficient from the junior colleges' data. These values showed no significant difference. A chi-square of 4.413 calculated from the data for all colleges showed a significant difference. This pattern occurred more frequently when responses were combined. The contingency coefficient of 0.234 indicated no significant difference.

Table 14 contains data for responses to the statement, "All courses taken at the junior and/or community college should be a part of the student's record and should be used in advising and evaluating the student's program." The senior colleges' responses yielded a chi-square of zero which indicated no significant differences of opinion. The zero value for the contingency coefficient supported the no significant difference idea. The junior colleges' data yielded a chi-square value of 1.247 which indicated no significant difference. The value of 0.194 for the contingency coefficient showed no significant difference. For all colleges, the chi-square value of 0.747 indicated no significant difference, and a value of 0.139 for the contingency coefficient supported this idea.

TABLE 13

POTENTIAL TRANSFER STUDENTS SHOULD BE INFORMED AS TO THE PRECISE EVALUATION OF THEIR APPLICATION AS SOON AS POSSIBLE WITHIN A PERIOD OF 15 DAYS AFTER RECEIPT OF APPLICATION

Responses	Senior Colleges[a]		Junior Colleges		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	18	12	9	6	27	18
Probably	3	5	6	3	9	8
Seldom	0	2	1	5	1	7
No	1	0	0	1	1	1
Uncertain	0	3	0	1	0	4
TOTAL	22	22	16	16	38	38
Chi-Square =	3.771		1.129		4.413	
Contingency Coefficient =	0.281		0.185		0.234	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 14

ALL COURSES TAKEN AT THE JUNIOR AND/OR COMMUNITY COLLEGE SHOULD BE A PART OF THE STUDENT'S RECORD AND SHOULD BE USED IN ADVISING AND EVALUATING THE STUDENT'S PROGRAM

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	20	20	12	9	32	29
Probably	2	0	2	7	4	7
Seldom	0	1	2	0	2	1
No	0	0	0	0	0	0
Uncertain	0	1	0	0	0	1
TOTAL	22	22	16	16	38	38
Chi-Square = 0			1.247		0.747	
Contingency Coefficient = 0			0.194		0.139	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = -.05.

Table 15 is a summary of the responses to the statement, "The satisfactory completion of an associate degree transfer program should guarantee upper division standing." The chi-square value of 0.170 from these data indicated no significant differences of opinion among responses received from senior colleges. A contingency coefficient of 0.062 indicated a negligible degree of difference for this group. The chi-square value of 4.500 calculated from data provided by junior colleges indicated a significant difference, and a contingency coefficient of 0.351 revealed a moderate degree of difference. A chi-square value of 3.055 for the combined data indicated no significant differences of opinion among key agents for all colleges. The contingency coefficient of 0.272 also revealed no significant difference.

Table 16 is a summary of the responses to the statement, "Junior and/or community college credit equal to half the baccalaureate degree program credit should be accepted to fulfill requirements for the degree." The calculations of a zero chi-square value and a zero contingency coefficient value for the senior colleges' data gave evidence of no significant differences of opinion among key agents. Data from the junior colleges yielded a chi-square value of 6.149 which indicated significant differences among responses of key agents in junior colleges. The contingency coefficient of 0.401 indicated a strong degree of difference. The chi-square value of 2.732 and the contingency coefficient value of 0.259 showed no significant difference for all colleges.

Table 17 contains the collection of data from the responses received on the statement, "The amount of credit normally earned by resident students in Physical Science and Mathematics during their first two years

TABLE 15

THE SATISFACTORY COMPLETION OF AN ASSOCIATE DEGREE TRANSFER PROGRAM SHOULD GUARANTEE UPPER DIVISION STANDING

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	4	3	11	5	15	8
Probably	12	11	5	10	17	21
Seldom	1	2	0	0	1	2
No	5	5	0	0	5	5
Uncertain	0	1	0	1	0	2
TOTAL	22	22	16	16	38	38
Chi-Square =	0.170		4.500		3.055	
Contingency Coefficient =	0.062		0.351		0.272	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 16

JUNIOR AND/OR COMMUNITY COLLEGE CREDIT EQUAL TO HALF THE BACCALAUREATE DEGREE PROGRAM CREDIT SHOULD BE ACCEPTED TO FULFILL REQUIREMENTS FOR THE DEGREE

Responses	Senior Colleges		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	6	6	12	5	18	11
Probably	9	8	4	10	13	18
Seldom	1	2	0	0	1	2
No	3	3	0	0	3	3
Uncertain	3	3	0	1	3	4
TOTAL	22	22	16	16	38	38
Chi-Square = 0			6.149		2.732	
Contingency Coefficient = 0			0.401		0.259	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 17

THE AMOUNT OF CREDIT NORMALLY EARNED BY RESIDENT STUDENTS IN PHYSICAL SCIENCE AND MATHEMATICS DURING THEIR FIRST TWO YEARS MAY SERVE AS A GUIDE IN ALLOWING TRANSFER CREDIT

Responses	Senior Colleges		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	6	5	4	5	10	10
Probably	6	5	6	5	12	10
Seldom	1	2	2	4	3	6
No	5	4	2	0	7	4
Uncertain	4	6	2	2	6	8
TOTAL	22	22	16	16	38	38
Chi-Square =	0.121		0.154		0	
Contingency Coefficient =	0.052		0.069		0	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

may serve as a guide in allowing transfer credit." Responses from the senior colleges yielded a chi-square value of 0.121 which revealed no significant difference. A contingency coefficient of 0.052 showed a negligible degree of difference. The junior colleges' data yielded a value of 0.154 for chi-square and a 0.069 value for the contingency coefficient. There was no significant difference for the chi-square interpretation. A negligible degree of difference was indicated by the contingency coefficient value. A value of zero was calculated from the data for all colleges and indicated no significant difference. A zero value for the contingency coefficient supported the no significant difference idea.

Table 18 is a summary of the responses to the statement, "Physical Science and Mathematics credits should be given for all junior and/or community college courses which satisfy baccalaureate degree requirements regardless of any restriction on the amount of credit transferred." The data from the senior colleges yielded a chi-square value of 0.458 which showed no significant differences of opinion among the key agents of senior colleges. A contingency coefficient of 0.101 indicated no significant difference. Data from the junior colleges yielded a chi-square of 2.133 which indicated no significant differences of opinion among key agents. A contingency coefficient of 0.250 also showed no significant difference. The chi-square value calculated from the data for all colleges of 2.192 indicated no significant difference and the contingency coefficient of 0.233 was interpreted as having a negligible degree of difference.

TABLE 18

PHYSICAL SCIENCE AND MATHEMATICS CREDITS SHOULD BE GIVEN FOR ALL JUNIOR AND/OR COMMUNITY COLLEGE COURSES WHICH SATISFY BACCALAUREATE DEGREE REQUIREMENTS REGARDLESS OF ANY RESTRICTION ON THE AMOUNT OF CREDIT TRANSFERRED

Responses	Senior Colleges		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	7	5	8	4	15	9
Probably	3	4	6	6	9	10
Seldom	1	1	0	3	1	4
No	7	6	1	1	8	7
Uncertain	4	6	1	2	5	8
TOTAL	22	22	16 16	16	38	38
Chi-Square =	0.458		2.133		2.192	
Contingency Coefficient =	0.101		0.250		0.233	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

Table 19 is a summary of responses to the statement, "Students should be allowed to take electives or advanced courses in Physical Science and Mathematics for satisfying program requirements for the degree if their transfer credits indicate satisfaction of all lower level courses." Calculations for senior colleges yielded a chi-square of 1.466 and a contingency value of 0.250. These values revealed no significant difference. For the junior colleges, values of 3.239 for chi-square and 0.410 for the contingency coefficient showed no significant difference according to chi-square, but indicated a moderate degree of difference according to the contingency coefficient. The all colleges' chi-square value of 4.266 revealed a significant difference and a value of 0.318 for the contingency coefficient supported the significant difference idea.

Table 20 is a summary of responses to the statement, "Grades of D earned by transfer students should be evaluated in the receiving institution on the same basis as D grades earned by resident students at that institution." The chi-square values of 0.091 for senior colleges, 0.213 for junior colleges, and 0.482 for all colleges showed no significant difference for any of the groups. The values for the contingency coefficients, 0.045 for the senior colleges, 0.115 for junior colleges, and 0.099 for all colleges indicated a negligible degree of difference for all groups.

Table 21 is a summary of the responses to the statement, "Transfer students may be advised to repeat courses without credit if their mastery of the subject matter content is considered unsatisfactory." The calcu-calculated chi-square values of 1.504 for senior colleges, zero for

TABLE 19

STUDENTS SHOULD BE ALLOWED TO TAKE ELECTIVES OR ADVANCED COURSES IN PHYSICAL SCIENCE AND MATHEMATICS FOR SATISFYING PROGRAM REQUIREMENTS FOR THE DEGREE IF THEIR TRANSFER CREDITS INDICATE SATISFACTION OF ALL LOWER LEVEL COURSES

Responses	Senior Colleges		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	12	8	12	7	24	15
Probably	10	12	2	6	12	18
Seldom	0	1	1	1	1	2
No	0	0	1	1	1	1
Uncertain	0	1	0	1	0	2
TOTAL	22	22	16	16	38	38
Chi-Square =	1.466		3.239		4.266	
Contingency Coefficient =	0.250		0.410		0.318	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 20

GRADES OF D EARNED BY TRANSFER STUDENTS SHOULD BE EVALUATED IN THE RECEIVING INSTITUTION ON THE SAME BASIS AS D GRADES EARNED BY RESIDENT STUDENTS AT THAT INSTITUTION

Responses	Senior Colleges		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	10	11	8	4	18	15
Probably	3	4	4	8	7	12
Seldom	2	0	2	2	4	2
No	6	4	2	2	8	6
Uncertain	1	3	0	0	1	3
TOTAL	22	22	16	16	38	38
Chi-Square =	0.091		0.213		0.482	
Contingency Coefficient =	0.045		0.115		0.099	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 21

TRANSFER STUDENTS MAY BE ADVISED TO REPEAT COURSES WITHOUT CREDIT IF THEIR MASTERY OF THE SUBJECT MATTER CONTENT IS CONSIDERED UNSATISFACTORY

Responses	Senior Colleges		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	11	7	3	3	14	10
Probably	4	2	9	5	13	7
Seldom	3	8	2	5	5	13
No	3	2	2	1	5	3
Uncertain	1	3	0	2	1	5
TOTAL	22	22	16	16	38	38
Chi-Square = 1.504			0		0.974	
Contingency Coefficient = 0.182			0		0.112	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

junior colleges, and 0.974 for all colleges showed no significant difference. Values of 0.182, zero, and 0.112 for the contingency coefficients of senior colleges, junior colleges, and all colleges, respectively, indicated no significant difference.

Table 22 is a summary of the responses to the statement, "Transfer students may reasonably be asked to take achievement examination for the purpose of placing them at the appropriate level in various sequences of Physical Science and Mathematics courses." The chi-square value for senior colleges of 3.771 fell just below the value for a significant difference. A value of 0.281 for the contingency coefficient showed no significant difference. A chi-square value of 0.368 and the contingency coefficient of 0.107 for junior colleges indicated no significant difference. A chi-square value of 3.713 and the contingency coefficient value of 0.216 indicated no significant difference for all colleges.

Table 23 is a summary of responses to the statement, "Examination results may be used as a basis for awarding credit or waiving degree requirements for junior and/or community college courses which might not otherwise transfer." The chi-square value of 1.091 for senior colleges, 0.667 for junior colleges, and 1.754 for all colleges showed no significant difference for all groups. The contingency coefficient values of 0.217 for senior colleges, 0.200 for junior colleges, and 0.210 for all colleges indicated no significant difference.

Table 24 shows the results of responses to the statement, "Each senior institution should work with the junior and/or community colleges from which it receives sizable numbers of transfers to identify those Physical Science and Mathematics courses that are parallel or equivalent

TABLE 22

TRANSFER STUDENTS MAY REASONABLY BE ASKED TO TAKE ACHIEVEMENT EXAMINATIONS FOR THE PURPOSE OF PLACING THEM AT THE APPROPRIATE LEVEL IN VARIOUS SEQUENCES OF PHYSICAL SCIENCE AND MATHEMATICS COURSES

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	10	4	2	1	12	5
Probably	6	3	4	5	10	8
Seldom	4	8	4	4	8	12
No	2	5	5	5	7	10
Uncertain	0	2	1	1	1	3
TOTAL	22	22	16	16	38	38
Chi-Square =	3.771		0.368		3.713	
Contingency Coefficient =	0.281		0.107		0.216	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 23

EXAMINATION RESULTS MAY BE USED AS A BASIS FOR AWARDING CREDIT OR WAIVING DEGREE REQUIREMENTS FOR JUNIOR AND/OR COMMUNITY COLLEGE COURSES WHICH MIGHT NOT OTHERWISE TRANSFER

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	7	4	5	3	12	7
Probably	6	5	6	5	12	10
Seldom	4	5	3	5	7	10
No	3	4	2	2	5	6
Uncertain	2	4	0	1	2	5
TOTAL	22	22	16	16	38	38
Chi-Square =	1.091		0.667		1.754	
Contingency Coefficient =	0.217		0.200		0.210	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 24

EACH SENIOR INSTITUTION SHOULD WORK WITH THE JUNIOR AND/OR COMMUNITY COLLEGES FROM WHICH IT RECEIVES SIZABLE NUMBERS OF TRANSFERS TO IDENTIFY THOSE PHYSICAL SCIENCE AND MATHEMATICS COURSES THAT ARE PARALLEL OR EQUIVALENT FOR TRANSFER

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	20	11	13	6	33	17
Probably	0	4	2	7	2	11
Seldom	0	4	0	2	0	6
No	0	1	1	0	1	1
Uncertain	2	2	0	1	2	3
TOTAL	22	22	16	16	38	38
Chi-Square =	8.844		6.348		14.966	
Contingency Coefficient =	0.535		0.532		0.532	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

for transfer." The chi-square values of 8.844 for senior colleges, 6.348 for junior colleges, and 14.966 for all colleges indicated a significant difference for each of them. The contingency coefficient values of 0.535 for senior colleges, 0.532 for junior colleges, and 0.532 for all colleges indicated a very strong degree of difference for each group.

The data in Table 25 summarizes responses to the statement, "Representatives from both senior institutions and junior and/or community colleges should review annually courses offered by the two types of institutions for which students will expect to receive transfer credit." Responses from the senior colleges gave a value of 9.402 for chi-square, and 0.547 for the contingency coefficient. These values revealed a significant difference. The chi-square value of 0.161 for junior colleges revealed no significant difference. A contingency coefficient of 0.071 indicated a negligible degree of difference in key agent responses from junior colleges. A chi-square value of 17.100 and a contingency coefficient of 0.557 for all colleges indicated a significant difference.

The data found in Table 26 shows the results of responses to the statement, "Senior institutions with specific requirements in the areas of Physical Science and Mathematics for college entrance at the freshman level should make these known to junior and/or community colleges from which they expect transfer students." A chi-square value of 3.771 for senior colleges was just slightly under the value selected for a significant difference. The contingency coefficient of 0.382 for this group showed a moderate degree of difference. Chi-square values of 6.348 for

TABLE 25

REPRESENTATIVES FROM BOTH SENIOR INSTITUTIONS AND JUNIOR AND/OR COMMUNITY COLLEGES SHOULD REVIEW ANNUALLY COURSES OFFERED BY THE TWO TYPES OF INSTITUTIONS FOR WHICH STUDENTS WILL EXPECT TO RECEIVE TRANSFER CREDIT

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	14	4	13	5	27	9
Probably	6	4	1	6	7	10
Seldom	1	5	2	5	3	10
No	1	8	0	0	1	8
Uncertain	0	1	0	0	0	1
TOTAL	22	22	16	16	38	38
Chi-Square =	9.402		0.161		17.100	
Contingency Coefficient =	0.547		0.071		0.557	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 26

SENIOR INSTITUTIONS WITH SPECIFIC REQUIREMENTS IN THE AREAS OF PHYSICAL SCIENCE AND MATHEMATICS FOR COLLEGE ENTRANCE AT THE FRESHMAN LEVEL SHOULD MAKE THESE KNOWN TO JUNIOR AND/OR COMMUNITY COLLEGES FROM WHICH THEY EXPECT TRANSFER STUDENTS

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	18	12	13	6	31	18
Probably	3	3	2	6	5	9
Seldom	0	3	1	4	1	7
No	0	1	0	0	0	1
Uncertain	1	3	0	0	1	3
TOTAL	22	22	16	16	38	38
Chi-Square =	3.771		6.348		9.708	
Contingency Coefficient =	0.382		0.532		0.451	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

junior colleges and 9.708 for all colleges showed a significant difference. Values of 0.532 for junior colleges and 0.451 for all colleges for the contingency coefficient indicated a strong degree of difference.

Table 27 is a summary of responses to the statement, "Agreements concerning parallel and equivalent courses from junior and/or community colleges and senior colleges should be communicated in writing to the appropriate personnel." Chi-square values of 4.464 for senior colleges, 15.676 for junior colleges, and 17.1 for all colleges gave evidence of a significant difference for each group. The contingency coefficients of 0.410 for senior colleges, 0.573 for junior colleges, and 0.557 for all colleges indicated a strong degree of difference.

Table 28 is a summary of the responses to the statement, "Junior and/or community colleges and senior colleges should plan together for gifted high school students to insure that credit earned before high school graduation will be accepted by both types of institutions." Responses from the senior colleges yielded a chi-square value of 4.956 and a contingency coefficient of 0.429 which revealed a strong degree of difference. The 3.137 value for chi-square and 0.404 value for the contingency coefficient for junior colleges showed no significant difference based on the chi-square value, but a moderate degree of difference based on the value of the contingency coefficient. The chi-square value of 7.773 and a value of 0.412 for the contingency coefficient indicated a significant difference for all colleges.

Table 29 is a summary of the responses to the statement, "The conditions under which credit is given to gifted high school students by

TABLE 27

AGREEMENTS CONCERNING PARALLEL AND EQUIVALENT COURSES FROM JUNIOR AND/OR COMMUNITY COLLEGES AND SENIOR COLLEGES SHOULD BE COMMUNICATED IN WRITING TO THE APPROPRIATE PERSONNEL

Responses	Senior Colleges		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	14	7	15	4	29	11
Probably	5	4	0	9	5	13
Seldom	1	5	1	2	2	7
No	0	2	0	0	0	2
Uncertain	2	4	0	1	2	5
TOTAL	22	22	16	16	38	38
Chi-Square =	4.464		15.676		17.100	
Contingency Coefficient =	0.410		0.573		0.557	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 28

JUNIOR AND/OR COMMUNITY COLLEGES AND SENIOR COLLEGES SHOULD PLAN TOGETHER FOR GIFTED HIGH SCHOOL STUDENTS TO INSURE THAT CREDIT EARNED BEFORE HIGH SCHOOL GRADUATION WILL BE ACCEPTED BY BOTH TYPES OF INSTITUTIONS

Responses	Senior Colleges[a]		Junior Colleges		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	11	4	11	6	22	10
Probably	5	6	2	4	7	10
Seldom	4	5	2	4	6	9
No	1	3	1	0	2	3
Uncertain	1	4	0	2	1	6
TOTAL	22	22	16	16	38	38
Chi-Square =	4.956		3.137		7.773	
Contingency Coefficient =	0.429		0.404		0.412	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 29

THE CONDITIONS UNDER WHICH CREDIT IS GIVEN TO GIFTED HIGH SCHOOL STUDENTS BY INSTITUTIONS OF HIGHER EDUCATION WHILE THEY ARE STILL IN HIGH SCHOOL SHOULD BE CLEARLY UNDERSTOOD BY THE HIGH SCHOOL, THE COLLEGE, AND THE STUDENTS INVOLVED

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	18	10	14	6	32	16
Probably	3	4	1	7	4	11
Seldom	0	4	1	2	1	6
No	0	2	0	0	0	2
Uncertain	1	2	0	1	1	3
TOTAL	22	22	16	16	38	38
Chi-Square =	6.286		8.533		14.476	
Contingency Coefficient =	0.471		0.590		0.525	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

institutions of higher education while they are still in high school should be clearly understood by the high school, the college, and the students involved." Chi-square values of 6.286 for senior colleges, 8.533 for junior colleges, and 14.476 for all colleges showed significant differences in the opinion of key agents within each group. The contingency coefficients of 0.471 for senior colleges, 0.590 for junior colleges, and 0.525 for all colleges supported the idea of a significant difference.

Table 30 is a summary of the responses to the statement, "Junior and/or community colleges and senior colleges should review and evaluate all special and/or remedial programs for the areas of Physical Science and Mathematics within the institutions and make agreements as to how these courses may fit into transfer credit." The chi-square values of 4.956 for senior colleges, 6.149 for junior colleges, and 10.794 for all colleges indicated a significant difference among the responses from the key agents of each group. The contingency coefficient values of 0.429 for senior colleges, 0.527 for junior colleges, and 0.470 for all colleges indicated a strong degree of difference for each group.

Data from this section showed significant differences by all groups for six of the eighteen statements. Of the remaining twelve, one senior college showed significant or near significant differences for three statements, which gave an overall significant difference of 50 percent for senior colleges. The junior colleges also showed significant differences for three of the remaining twelve statements. This gave an overall 50 percent of key agents' responses among junior colleges which showed a significant difference.

TABLE 30

JUNIOR AND/OR COMMUNITY COLLEGES AND SENIOR COLLEGES SHOULD REVIEW AND EVALUATE ALL SPECIAL AND/OR REMEDIAL PROGRAMS FOR THE AREAS OF PHYSICAL SCIENCE AND MATHEMATICS WITHIN THE INSTITUTIONS AND MAKE AGREEMENTS AS TO HOW THESE COURSES MAY FIT INTO TRANSFER CREDIT

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	11	4	11	4	22	8
Probably	8	5	3	4	11	9
Seldom	1	4	1	6	2	10
No	1	6	1	1	2	7
Uncertain	1	3	0	1	1	4
TOTAL	22	22	16	16	38	38
Chi-Square =	4.956		6.149		10.794	
Contingency Coefficient =	0.429		0.527		0.470	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

Table 31 contains data for all of the responses within this section. The chi-square value for senior colleges of 32.716 showed a significant difference when data for all of the statements of this section were combined. A contingency coefficient of 0.276 indicated a negligible degree of difference for combined responses.

The combined data from the responses of key agents of the junior colleges yielded a chi-square value of 52.924 and a value of 0.394 for the contingency coefficient which showed a significant difference. The 82.028 chi-square value for the total combined responses from all colleges indicated a significant difference. A 0.327 value for the contingency coefficient indicated a moderate degree of difference. Key agents of Arkansas schools were in agreement that approximately one-half of the criteria proposed in Guidelines by the Joint Committee for this section were being practiced in the college and university systems of Arkansas.

III. CURRICULUM PLANNING FOR PHYSICAL SCIENCE AND MATHEMATICS

The Joint Committee on Junior and Senior Colleges raised the following questions concerning curriculum planning:

> 1. What steps can be taken to avoid loss of time and credit by junior college students who transfer during a period of curriculum change?
> 2. What implications for curriculum planning are there in the diversion of transfer students from the institutions of their choice?
> 3. What are the special needs of the exceptionally talented high school graduates who attend junior college before entering a senior institution as upper classmen? (Joint Committee, pp. 11-12)

TABLE 31

SUMMARY TABLE FOR EVALUATION OF TRANSFER COURSES FOR PHYSICAL SCIENCE AND MATHEMATICS

Responses	Senior Colleges		Junior Colleges		All Colleges	
	D.P.[a]	C.P.[b]	D.P.[a]	C.P.[b]	D.P.[a]	C.P.[b]
Yes	217	137	176	89	393	226
Probably	94	89	65	113	159	202
Seldom	24	62	25	54	49	116
No	38	56	18	14	56	70
Uncertain	23	52	4	18	27	70
TOTAL	396	396	288	288	684	684
Chi-Square =	32.716		52.924		82.028	
Contingency Coefficient =	0.276		0.394		0.327	

[a]Desired Practice.

[b]Current Practice.

P = 0.05.

Table 32 contains data from the statement, "Transfer students should be given the option of satisfying graduation requirements which were in effect in senior colleges at the time they enrolled as freshmen." A no significant difference was revealed by the chi-square values for these data: 0.786, 2.400, and 2.827 for senior colleges, junior colleges, and all colleges, respectively.

The senior college data yielded a contingency coefficient of 0.186 which indicated no significant difference. The value of the contingency coefficient for junior colleges of 0.361 showed a moderate degree of difference. A value of 0.263 for the contingency coefficient for all colleges indicated no significant difference.

Table 33 is a summary of the responses to the statement, "Senior institutions should notify the junior and/or community colleges as early as possible of impending curriculum changes which may affect transfer credits." The responses from the senior colleges yielded a chi-square value of 2.909. This gave evidence of no significant difference. The corresponding contingency coefficient value of 0.342 showed a moderate degree of difference. Responses from the junior colleges yielded a chi-square value of 4.000. This revealed a significant difference. The contingency coefficient value of 0.447 also indicated a significant difference. A chi-square value of 6.737 for all colleges showed a significant difference, while the contingency coefficient value of 0.388 showed a moderate degree of difference.

Table 34 is a summary of the responses to the statement, "Junior and/or community colleges should advise the senior institutions of proposed changes in their courses." The chi-square values were 4.096 for

TABLE 32

TRANSFER STUDENTS SHOULD BE GIVEN THE OPTION OF SATISFYING GRADUATION REQUIREMENTS WHICH WERE IN EFFECT IN SENIOR COLLEGES AT THE TIME THEY ENROLLED AS FRESHMEN

Responses	Senior Colleges		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	10	6	9	3	19	9
Probably	4	7	5	5	9	12
Seldom	1	2	1	5	2	7
No	6	6	1	0	7	6
Uncertain	1	1	0	3	1	4
TOTAL	22	22	16	16	38	38
Chi-Square =	0.786		2.400		2.827	
Contingency Coefficient =	0.186		0.361		0.263	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 33

SENIOR INSTITUTIONS SHOULD NOTIFY THE JUNIOR AND/OR COMMUNITY COLLEGES AS EARLY AS POSSIBLE OF IMPENDING CURRICULUM CHANGES WHICH MAY AFFECT TRANSFER CREDITS

Responses	Senior Colleges		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	15	7	12	4	27	11
Probably	5	7	1	3	6	10
Seldom	1	5	2	8	3	13
No	1	1	1	0	2	1
Uncertain	0	2	0	1	0	3
TOTAL	22	22	16	16	38	38
Chi-Square =	2.909		4.000		6.737	
Contingency Coefficient =	0.342		0.447		0.388	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 34

JUNIOR AND/OR COMMUNITY COLLEGES SHOULD ADVISE THE SENIOR INSTITUTIONS OF PROPOSED CHANGES IN THEIR COURSES

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	12	3	12	5	24	8
Probably	7	4	3	5	10	9
Seldom	0	8	1	5	1	13
No	2	5	0	1	2	6
Uncertain	1	2	0	0	1	2
TOTAL	22	22	16	16	38	38
Chi-Square =	4.096		4.227		6.909	
Contingency Coefficient =	0.396		0.457		0.392	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

senior colleges, 4.227 for junior colleges, and 6.909 for all colleges. These values indicated significant differences for all groups. The contingency coefficient values were 0.396 for senior colleges, 0.457 for junior colleges, and 0.392 for all colleges. This indicated a strong degree of difference for junior colleges, and a moderate degree of difference for senior colleges and the combined colleges.

Table 35 is a summary of the responses to the statement, "When a change made by the senior institution necessitates some type of change in the junior and/or community college, sufficient lead time should be given to effect the change with a minimum of disruption." All chi-square values calculated for this table showed a significant difference. The chi-square values were 7.827 for senior colleges, 4.063 for junior colleges, and 11.810 for all colleges. The corresponding contingency coefficient values were 0.512 for senior colleges, 0.450 for junior colleges, and 0.487 for all colleges. Both sets of values gave evidence of a significant degree of difference for these groups.

Table 36 contains data formulated from responses to the following statement: "Faculty members from the two types of colleges should work together to identify common curriculum concerns and experiences which may be built into their respective programs." The chi-square value for senior colleges of 4.422 and its corresponding contingency coefficient value of 0.409 showed a significant difference. The values for junior colleges of 1.164 for chi-square and 0.260 for the contingency coefficient revealed no significant difference. Data for all colleges yielded a chi-square value of 5.268 and a contingency coefficient value of 0.349. This indicated a

TABLE 35

WHEN A CHANGE MADE BY THE SENIOR INSTITUTION NECESSITATES SOME TYPE OF CHANGE IN THE JUNIOR AND/OR COMMUNITY COLLEGE, SUFFICIENT LEAD TIME SHOULD BE GIVEN TO EFFECT THE CHANGE WITH A MINIMUM OF DISRUPTION

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	16	3	11	3	27	6
Probably	5	5	1	6	6	11
Seldom	0	8	3	5	3	13
No	1	5	0	1	1	6
Uncertain	0	1	1	1	1	2
TOTAL	22	22	16	16	38	38
Chi-Square =	7.827		4.063		11.810	
Contingency Coefficient =	0.512		0.450		0.487	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 36

FACULTY MEMBERS FROM THE TWO TYPES OF COLLEGES SHOULD WORK TOGETHER TO IDENTIFY COMMON CURRICULUM CONCERNS AND EXPERIENCES WHICH MAY BE BUILT INTO THEIR RESPECTIVE PROGRAMS

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	11	2	7	3	18	5
Probably	7	5	5	4	12	9
Seldom	0	8	4	6	4	14
No	1	4	0	1	1	5
Uncertain	3	3	0	2	3	5
TOTAL	22	22	16	16	38	38
Chi-Square =	4.422		1.164		5.268	
Contingency Coefficient =	0.409		0.260		0.349	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05

significant difference for the chi-square value, and a moderate degree of difference for the value of the contingency coefficient.

Table 37 is a summary of the responses to the statement, "Flexibility in curriculum matters should be strongly encouraged so that students who have been diverted to the institution of their second or third choice will not be delayed by differing requirements in completing their degree program." The values of chi-square were 1.222 for senior colleges, 1.932 for junior colleges, and 3.069 for all colleges. Each of these values showed no significant difference. The corresponding contingency coefficient values of 0.229 for senior colleges, 0.271 for junior colleges, and 0.273 for all colleges indicated no significant difference.

Table 38 shows the results of responses to the statement, "If the work of junior and/or community college students is outstanding, the senior college should make every effort to have them participate in advanced or honor programs after transfer." Chi-square values of 1.768 for senior colleges, 1.732 for junior colleges, and 3.457 for all colleges indicated no significant difference for any group. The contingency coefficient values of 0.273 for senior colleges, 0.312 for junior colleges, and 0.289 for all colleges also indicated no significant difference for any group.

Table 39 is a summary of the responses to the statement, "Junior and/or community colleges have the responsibility to identify and attempt to develop latent talent which did not manifest itself in academic achievement during high school." The value for chi-square of 4.911 was calculated from the data for senior colleges and indicated a significant difference. The corresponding contingency coefficient value of 0.427

TABLE 37

FLEXIBILITY IN CURRICULUM MATTERS SHOULD BE STRONGLY ENCOURAGED SO THAT STUDENTS WHO HAVE BEEN DIVERTED TO THE INSTITUTION OF THEIR SECOND OR THIRD CHOICE WILL NOT BE DELAYED BY DIFFERING REQUIREMENTS IN COMPLETING THEIR DEGREE PROGRAM

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	6	2	7	2	13	4
Probably	5	5	7	4	12	9
Seldom	5	7	2	9	7	16
No	4	6	0	0	4	6
Uncertain	2	2	0	1	2	3
TOTAL	22	22	16	16	38	38
Chi-Square =	1.222		1.932		3.069	
Contingency Coefficient =	0.229		0.271		0.273	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 38

IF THE WORK OF JUNIOR AND/OR COMMUNITY COLLEGE STUDENTS IS OUTSTANDING, THE SENIOR COLLEGE SHOULD MAKE EVERY EFFORT TO HAVE THEM PARTICIPATE IN ADVANCED OR HONOR PROGRAMS AFTER TRANSFER

Responses	Senior Colleges		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	11	5	8	3	19	8
Probably	9	8	7	5	16	13
Seldom	0	5	0	3	0	8
No	0	2	0	0	0	2
Uncertain	2	2	1	5	3	7
TOTAL	22	22	16	16	38	38
Chi-Square =	1.768		1.732		3.475	
Contingency Coefficient =	0.273		0.312		0.289	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 39

JUNIOR AND/OR COMMUNITY COLLEGES HAVE THE RESPONSIBILITY TO IDENTIFY AND ATTEMPT TO DEVELOP LATENT TALENT WHICH DID NOT MANIFEST ITSELF IN ACADEMIC ACHIEVEMENT DURING HIGH SCHOOL

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	13	3	9	4	22	7
Probably	6	9	5	8	11	17
Seldom	0	2	1	2	1	4
No	0	2	0	0	0	2
Uncertain	3	6	1	2	4	8
TOTAL	22	22	16	16	38	38
Chi-Square =	4.911		1.619		6.273	
Contingency Coefficient =	0.427		0.303		0.376	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

indicated a significant difference. The 1.619 value for chi-square calculated from junior colleges' data gave evidence of no significant difference. A corresponding contingency coefficient of 0.303 indicated no significant difference. For all colleges, a chi-square value of 6.273 and contingency coefficient value of 0.376 gave evidence of a significant difference according to the chi-square value, and a moderate degree of difference according to the contingency coefficient.

Table 40 represents the results of responses to the statement, "Junior and/or community college students with outstanding academic records should be allowed to participate in senior college honor programs after transfer." Chi-square values of 2.909 for senior colleges, 1.000 for junior colleges, and 3.789 for all colleges showed no significant difference. The corresponding contingency coefficient values of 0.342 for senior colleges, 0.242 for junior colleges, and 0.301 for all colleges showed a moderate degree of difference for senior colleges and all colleges, but indicated a negligible degree of difference for junior colleges.

Two of the nine tables on Curriculum Planning for Physical Science and Mathematics had chi-square values for each group which gave evidence of a significant difference. A total of four chi-square values for senior colleges indicated a significant difference, but only three of the chi-square values calculated for junior colleges indicated a significant difference.

Table 41 is an accumulation of all of the responses for this section. The chi-square value of 27.268 for senior colleges, 19.410 for junior colleges, and 46.600 for all colleges gave evidence of significant

TABLE 40

JUNIOR AND/OR COMMUNITY COLLEGE STUDENTS WITH OUTSTANDING ACADEMIC RECORDS SHOULD BE ALLOWED TO PARTICIPATE IN SENIOR COLLEGE HONOR PROGRAMS AFTER TRANSFER

Responses	Senior Colleges		Junior Colleges		All Colleges	
	D.P.[a]	C.P.[b]	D.P.[a]	C.P.[b]	D.P.[a]	C.P.[b]
Yes	15	7	10	6	25	13
Probably	5	10	6	5	11	15
Seldom	0	2	0	1	0	3
No	0	1	0	0	0	1
Uncertain	2	2	0	4	2	6
TOTAL	22	22	16	16	38	38
Chi-Square =	2.909		1.000		3.789	
Contingency Coefficient =	0.342		0.242		0.301	

[a]Desired Practice.

[b]Current Practice.

P = 0.05.

TABLE 41

SUMMARY TABLE FOR CURRICULUM PLANNING FOR PHYSICAL SCIENCE AND MATHEMATICS

Responses	Senior Colleges		Junior Colleges		All Colleges	
	D.P.[a]	C.P.[b]	D.P.[a]	C.P.[b]	D.P.[a]	C.P.[b]
Yes	109	38	85	33	194	71
Probably	53	60	40	45	93	105
Seldom	7	47	14	44	21	91
No	15	32	2	3	17	35
Uncertain	14	21	3	19	17	40
TOTAL	198	198	144	144	342	342
Chi-Square =	27.268		19.410		46.600	
Contingency Coefficient =	0.348		0.345		0.346	

[a]Desired Practice.

[b]Current Practice.

P = 0.05.

differences of opinion among key agents. The contingency coefficient values of 0.348 for senior colleges, 0.345 for junior colleges, and 0.346 for all colleges indicated a moderate degree of difference. These values revealed that there was some agreement among key agents in Arkansas colleges relative to curriculum planning for Physical Science and Mathematics.

IV. ARTICULATION PROGRAMS FOR PHYSICAL SCIENCE AND MATHEMATICS

Guidelines for Improving Articulation Between Junior and Senior Colleges cited several issues which directly relate to articulation programs. Issues pertinent to this study follow:

1. If articulation efforts are to be effective, what type of representation is needed?

2. What kinds of procedures are necessary for effective articulation?

3. How may effective articulation be accomplished?

4. Is there a need for both institutional and statewide articulation activities?

5. How can good communication be achieved?

6. How can articulation machinery be kept up-to-date and responsive to current problems?

Information relative to these kinds of questions will be useful in the kinds of decision making which are vital to an effective articulation process.

Table 42 is a summary of the responses to the statement, "Articulation activities should involve representatives from high schools, the two types of colleges, state departments of education, coordinating agencies of subject areas, and professional associations." Chi-square values of 3.422 for senior colleges and 1.932 for junior colleges revealed no significant difference. The corresponding contingency coefficient values of 0.367 for senior colleges and 0.328 for junior colleges showed a moderate degree of difference in the responses of key agents. Data for all colleges yielded a chi-square value of 5.241 and a contingency coefficient value of 0.348. These values revealed a significant difference for the combined responses from key agents of both types of colleges.

Table 43 consists of data from the responses to the statement, "Faculty members, counselors, admission officers, registrars, research workers, deans, presidents, and students should be involved in articulation agreements." Data for the senior colleges produced a chi-square value of 3.667 and a contingency coefficient of 0.378. These values indicated no significant difference for the chi-square value, but a moderate degree of difference according to the contingency coefficient. Chi-square values of 0.254 for junior colleges and 2.923 for all colleges revealed no significant difference. The contingency coefficients of 0.125 for junior colleges, and 0.267 for all colleges indicated a negligible degree of difference for these groups.

Table 44 is a summary of the responses to the statement, "Administrators at the policy-making level should review and approve agreements made by departments or program specialists." The chi-square values of 2.232 for senior colleges and 3.174 for junior colleges

TABLE 42

ARTICULATION ACTIVITIES SHOULD INVOLVE REPRESENTATIVES FROM HIGH SCHOOLS, THE TWO TYPES OF COLLEGES, STATE DEPARTMENTS OF EDUCATION, COORDINATING AGENCIES OF SUBJECT AREAS, AND PROFESSIONAL ASSOCIATIONS

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges[a]	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	8	1	7	2	15	3
Probably	8	7	5	4	13	11
Seldom	1	6	3	4	4	10
No	3	4	1	3	4	7
Uncertain	2	4	0	3	2	7
TOTAL	22	22	16	16	38	38
Chi-Square =	3.422		1.932		5.241	
Contingency Coefficient =	0.367		0.328		0.348	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 43

FACULTY MEMBERS, COUNSELORS, ADMISSIONS OFFICERS, REGISTRARS, RESEARCH WORKERS, DEANS, PRESIDENTS, AND STUDENTS SHOULD BE INVOLVED IN ARTICULATION AGREEMENTS

Responses	Senior Colleges[a]		Junior Colleges		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	10	2	8	6	18	8
Probably	7	4	3	0	10	4
Seldom	0	8	3	4	3	12
No	2	4	1	3	3	7
Uncertain	3	4	1	3	4	7
TOTAL	22	22	16	16	38	38
Chi-Square =	3.667		0.254		0.923	
Contingency Coefficient =	0.378		0.125		0.267	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 44

ADMINISTRATORS AT THE POLICY-MAKING LEVEL SHOULD REVIEW AND APPROVE AGREEMENTS MADE BY DEPARTMENTS OR PROGRAM SPECIALISTS

Responses	Senior Colleges		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	14	7	10	3	24	10
Probably	6	9	5	7	11	16
Seldom	0	3	1	3	1	6
No	0	1	0	1	0	2
Uncertain	2	2	0	2	2	4
TOTAL	22	22	16	16	38	38
Chi-Square =	2.232		3.174		5.216	
Contingency Coefficient =	0.303		0.407		0.347	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

showed no significant differences of opinion among key agents. The combined responses produced a chi-square of 5.216 which indicated a significant difference. Contingency coefficient values of 0.303 for senior colleges, 0.302 for junior colleges, and 0.347 for all colleges gave evidence of a low degree of difference.

Table 45 is the result of responses to the statement, "Representation from each segment or sector of education must be involved if articulation agreements are to be meaningful." The chi-square values of 3.143 for senior colleges, 3.000 for junior colleges, and 5.968 for all colleges gave evidence of no significant difference for senior or junior colleges. However, the combined responses indicated a significant difference. The corresponding contingency coefficient values of 0.354 for senior colleges, 0.397 for junior colleges, and 0.368 for all colleges showed a moderate degree of difference for each group.

The data in Table 46 were compiled from responses to the statement, "Junior and/or community colleges and senior colleges should establish procedures for identifying problems." The values for chi-square were 2.933 for senior colleges, 1.732 for junior colleges, and 4.604 for all colleges. The corresponding contingency coefficient values were 0.343 for senior colleges, 0.312 for junior colleges, and 0.329 for all colleges. These values revealed no significant difference for junior and senior colleges, but for the combined responses a significant difference was revealed.

Table 47 is a summary of the responses to the statement, "Junior and/or community colleges and senior colleges should establish means for effective communication between themselves." Chi-square values of 5.604

TABLE 45

REPRESENTATION FROM EACH SEGMENT OR SECTOR OF EDUCATION MUST BE INVOLVED IF ARTICULATION AGREEMENTS ARE TO BE MEANINGFUL

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	12	4	7	1	19	5
Probably	5	5	5	8	10	13
Seldom	1	6	3	2	4	8
No	1	4	0	2	1	6
Uncertain	3	3	1	3	4	6
TOTAL	22	22	16	16	38	38
Chi-Square =	3.143		3.000		5.968	
Contingency Coefficient =	0.354		0.397		0.368	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 46

JUNIOR AND/OR COMMUNITY COLLEGES AND SENIOR COLLEGES SHOULD ESTABLISH PROCEDURES FOR IDENTIFYING PROBLEMS

Responses	Senior Colleges		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	14	6	8	3	22	9
Probably	5	7	6	6	11	13
Seldom	0	3	1	2	1	5
No	0	3	1	0	1	3
Uncertain	3	3	0	5	3	8
TOTAL	22	22	16	16	38	38
Chi-Square =	2.933		1.732		4.604	
Contingency Coefficient =	0.343		0.312		0.329	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 47

JUNIOR AND/OR COMMUNITY COLLEGES AND SENIOR COLLEGES SHOULD ESTABLISH MEANS FOR EFFECTIVE COMMUNICATION BETWEEN THEMSELVES

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	15	4	8	2	23	6
Probably	3	5	6	7	9	12
Seldom	0	7	2	6	2	13
No	0	2	0	0	0	2
Uncertain	4	4	0	1	4	5
TOTAL	22	22	16	16	38	38
Chi-Square =	5.604		2.618		8.057	
Contingency Coefficient =	0.450		0.375		0.418	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

for senior colleges, 2.618 for junior colleges, and 8.057 for all colleges showed a significant difference for senior colleges and all colleges, but no significant difference for the junior colleges' responses. The corresponding contingency coefficient values were 0.450 for senior colleges, 0.375 for junior colleges, and 0.418 for all colleges. These values indicated a strong degree of difference in the responses from senior colleges and all colleges, and a moderate degree of difference in the responses from junior colleges.

Table 48 is the result of responses to the statement, "Junior and/or community colleges and senior colleges should have established procedures for initiating needed studies for articulation." The calculated values for chi-square were 6.120 for senior colleges, 0.696 for junior colleges, and 5.968 for all colleges. The corresponding values for the contingency coefficients were 0.466 for senior colleges, 0.204 for junior colleges, and 0.368 for all colleges. These values showed a significant difference for senior colleges and all colleges, but no significant difference for junior colleges.

Table 49 is a summary of the responses to the statement, "Junior and/or community colleges and senior colleges should have procedures for proposing solutions to subject-matter area problems." The values calculated from these data were chi-squares of 6.120 for senior colleges, 3.394 for junior colleges, and 9.471 for all colleges. These values showed a significant difference among responses from senior colleges, no significant difference for junior colleges, and a significant difference among responses from all colleges. The corresponding contingency coefficient values of 0.466 for junior colleges, 0.418 for junior

TABLE 48

JUNIOR AND/OR COMMUNITY COLLEGES AND SENIOR COLLEGES SHOULD HAVE ESTABLISHED PROCEDURES FOR INITIATING NEEDED STUDIES FOR ARTICULATION

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	13	2	6	3	19	5
Probably	6	5	7	3	13	8
Seldom	0	8	3	8	3	16
No	0	4	0	0	0	4
Uncertain	3	3	0	2	3	5
TOTAL	22	22	16	16	38	38
Chi-Square =	6.120		0.696		5.968	
Contingency Coefficient =	0.466		0.204		0.368	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 49

JUNIOR AND/OR COMMUNITY COLLEGES AND SENIOR COLLEGES SHOULD HAVE PROCEDURES FOR PROPOSING SOLUTIONS TO SUBJECT-MATTER AREA PROBLEMS

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	13	2	9	2	22	4
Probably	6	6	4	6	10	12
Seldom	0	7	3	3	3	10
No	0	3	0	3	0	6
Uncertain	3	4	0	2	3	6
TOTAL	22	22	16	16	38	38
Chi-Square =	6.120		3.394		9.471	
Contingency Coefficient =	0.466		0.418		0.447	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

colleges, and 0.447 for all colleges revealed a strong degree of difference for each group.

Table 50 is the result of responses to the statement, "Junior and/or community colleges and senior colleges should have established procedures for ratifying and implementing agreements which affect the transfer credits." Two of the chi-square values from this table indicated a significant difference: 6.600 for senior colleges, and 6.909 for all colleges. The chi-square value of 1.067 for junior colleges indicated no significant difference. The corresponding values for the contingency coefficients, 0.480 for senior colleges, 0.250 for junior colleges, and 0.392 for all colleges showed a strong degree of difference for senior colleges, a negligible degree of difference for junior colleges, and a moderate degree of difference for the combined colleges.

Table 51 is the result of responses to the statement, "Articulation machinery should be voluntary with respect to specific procedures for reaching agreements between the two types of colleges." A chi-square of 4.096 for senior colleges revealed a significant difference, and the contingency coefficient value of 0.396 indicated a moderate degree of difference. The junior colleges' values of 1.641 for chi-square and 0.305 for the contingency coefficient showed no significant difference. A value of 5.560 for chi-square showed a significant difference, while the value of 0.357 for the contingency coefficient indicated a moderate degree of difference for all colleges.

Table 52 is a summary of the responses to the statement, "In addition to some overall administrative coordination, committees should be employed for the solution of specific problems." Chi-square values of 2.675 for

TABLE 50

JUNIOR AND/OR COMMUNITY COLLEGES AND SENIOR COLLEGES SHOULD HAVE ESTABLISHED PROCEDURES FOR RATIFYING AND IMPLEMENTING AGREEMENTS WHICH AFFECT THE TRANSFER CREDITS

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	16	4	8	4	24	8
Probably	3	3	4	5	7	8
Seldom	0	10	3	4	3	14
No	0	2	0	0	0	2
Uncertain	3	3	1	3	4	6
TOTAL	22	22	16	16	38	38
Chi-Square =	6.600		1.067		6.909	
Contingency Coefficient =	0.480		0.250		0.392	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 51

ARTICULATION MACHINERY SHOULD BE VOLUNTARY WITH RESPECT TO SPECIFIC PROCEDURES FOR REACHING AGREEMENTS BETWEEN THE TWO TYPES OF COLLEGES

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	12	3	5	1	17	4
Probably	6	9	6	5	12	14
Seldom	1	5	1	5	2	10
No	0	1	2	2	2	3
Uncertain	3	4	2	3	5	7
TOTAL	22	22	16	16	38	38
Chi-Square =	4.096		1.641		5.560	
Contingency Coefficient =	0.396		0.305		0.357	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 52

IN ADDITION TO SOME OVERALL ADMINISTRATIVE COORDINATION, COMMITTEES SHOULD BE EMPLOYED FOR THE SOLUTION OF SPECIFIC PROBLEMS

Responses	Senior Colleges[a]		Junior Colleges		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	10	3	7	7	17	10
Probably	5	5	4	0	9	5
Seldom	3	6	3	6	6	12
No	1	4	2	2	3	6
Uncertain	3	4	0	1	3	5
TOTAL	22	22	16	16	38	38
Chi-Square =	2.675		0		1.407	
Contingency Coefficient =	0.329		0		0.189	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05

senior colleges, zero for junior colleges, and 1.407 for all colleges showed no significant difference among responses of key agents from each of these groups. The contingency coefficients yielded values of 0.329 for the senior colleges, zero for the junior colleges, and 0.189 for all colleges. These values showed a low degree of difference for senior colleges, and a negligible degree of difference for the other groups.

Table 53 contains data for the responses from the statement, "A standing committee should be established with representatives from the two types of colleges for considering problems." The values for chi-square were 3.667 for senior colleges, 3.000 for junior colleges, and 6.650 for all colleges. These values revealed no significant difference among the responses from the key agents of senior and colleges, but a significant difference was revealed when responses were combined. Values for the corresponding contingency coefficient were 0.378 for senior colleges, 0.397 for junior colleges, and 0.386 for all colleges. These values revealed a moderate degree of difference for each group.

Table 54 is a summary of the responses to the statement, "State and regional conferences should be held to review matters in which there is broad interest." This table yielded chi-square values of 4.422 for senior colleges, 3.000 for junior colleges, and 7.402 for all colleges. These values showed a significant difference among responses from senior colleges, no significant difference for junior colleges, and a significant difference for combined colleges. The corresponding values for the contingency coefficients were 0.409 for senior colleges, 0.397 for junior

TABLE 53

A STANDING COMMITTEE SHOULD BE ESTABLISHED WITH REPRESENTATIVES FROM THE TWO TYPES OF COLLEGES FOR CONSIDERING PROBLEMS

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges[a]	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	10	2	7	1	17	3
Probably	4	2	5	5	9	7
Seldom	3	5	3	5	6	10
No	1	9	1	4	2	13
Uncertain	4	4	0	1	4	5
TOTAL	22	22	16	16	38	38
Chi-Square =	3.667		3.000		6.650	
Contingency Coefficient =	0.378		0.397		0.386	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 54

STATE AND REGIONAL CONFERENCES SHOULD BE HELD TO REVIEW MATTERS IN WHICH THERE IS BROAD INTEREST

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges[a]	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	11	2	7	1	18	3
Probably	6	2	6	7	12	9
Seldom	1	10	2	1	3	11
No	1	4	0	5	1	9
Uncertain	3	4	1	2	4	6
TOTAL	22	22	16	16	38	38
Chi-Square =	4.422		3.000		7.402	
Contingency Coefficient =	0.409		0.397		0.404	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.50.

colleges, and 0.404 for all colleges. These values indicated a moderately strong degree of difference for each group.

Table 55 is a summary of the responses to the statement, "Articulation procesures between institutions should include visits between campuses by college personnel and students, interchange of newsletters, and other similar expressions of cooperative planning." The calculations yielded chi-square values of 1.198 for senior colleges, 0.254 for junior colleges, and 0.245 for all colleges. These values showed no significant difference among responses from any group. The corresponding contingency coefficient values were 0.227 for senior colleges, 0.125 for junior colleges, and 0.080 for all colleges. These values showed a negligible degree of difference for all groups.

Table 56 contains data from the statement, "Institutional articulation should provide means for interviews between transfer students and their former advisors and instructors." The chi-square value of 2.348 for senior colleges, 3.000 for junior colleges, and 5.037 for all colleges indicated no significant difference for senior or junior colleges' responses, but indicated a significant difference for combined responses. The corresponding contingency coefficient values of 0.310 for senior colleges, 0.397 for junior colleges, and 0.342 for all colleges gave evidence of a moderate degree of difference among responses.

Table 57 is a summary of the responses to the statement, "Articulation communication should include inter-campus visitation of faculty." Chi-square values of 2.970 for senior colleges, 0.254 for junior colleges, and 2.414 for all colleges showed no significant difference between responses of either group. The corresponding

TABLE 55

ARTICULATION PROCEDURES BETWEEN INSTITUTIONS SHOULD INCLUDE VISITS BETWEEN CAMPUSES BY COLLEGE PERSONNEL AND STUDENTS, INTERCHANGE OF NEWSLETTERS, AND OTHER SIMILAR EXPRESSIONS OF COOPERATIVE PLANNING

Responses	Senior Colleges		Junior Colleges		All Colleges	
	D.P.[a]	C.P.[b]	D.P.[a]	C.P.[b]	D.P.[a]	C.P.[b]
Yes	11	6	6	8	17	14
Probably	5	0	7	0	12	0
Seldom	3	8	3	4	6	12
No	0	5	0	3	0	8
Uncertain	3	3	0	1	3	4
TOTAL	22	22	16	16	38	38
Chi-Square = 1.198			0.254		0.245	
Contingency Coefficient = 0.227			0.125		0.080	

[a]Desired Practice.

[b]Current Practice.

P = 0.05.

TABLE 56

INSTITUTIONAL ARTICULATION SHOULD PROVIDE MEANS FOR INTERVIEWS BETWEEN TRANSFER STUDENTS AND THEIR FORMER ADVISORS AND INSTRUCTORS

Responses	Senior Colleges		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	12	5	7	1	19	6
Probably	7	0	4	5	11	5
Seldom	0	9	3	4	3	13
No	0	5	1	3	1	8
Uncertain	3	3	1	3	4	6
TOTAL	22	22	16	16	38	38
Chi-Square =	2.348		3.000		5.037	
Contingency Coefficient =	0.310		0.397		0.342	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 57

ARTICULATION COMMUNICATION SHOULD INCLUDE INTER-CAMPUS VISITATION OF FACULTY

Responses	Senior Colleges[a]		Junior Colleges		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	9	2	8	6	17	8
Probably	4	1	5	0	9	1
Seldom	4	9	2	6	6	15
No	0	5	1	4	1	9
Uncertain	5	5	0	0	5	5
TOTAL	22	22	16	16	38	38
Chi-Square =	2.970		0.254		2.414	
Contingency Coefficient =	0.345		0.125		0.244	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

contingency coefficient values of 0.345 for senior colleges, 0.125 for junior colleges, and 0.244 for all colleges indicated a low degree of difference for senior colleges, and a negligible degree of difference for the other groups.

Table 58 is a summary of responses to the statement, "Dissemination of research results between institutions should facilitate articulation communications." The chi-square values of 1.365 for senior colleges, 0.069 for junior colleges, and 1.096 for all colleges gave evidence of no significant difference for all groups. The corresponding contingency coefficient values of 0.242 for senior colleges, 0.066 for junior colleges, and 0.167 for all colleges showed no significant difference for all groups.

Table 59 contains data from responses to the statement, "Articulation programs should provide built-in periodic evaluation of the adequacy of the procedures including the effectiveness of types of personnel involved, appropriateness of the problems considered, and concrete achievements attained." The chi-square value for senior colleges of 4.909 and its corresponding contingency coefficient of 0.427 indicated a significant difference. The data for junior colleges yielded a chi-square of 0.065 and a contingency coefficient of 0.064. These values revealed no significant difference. The chi-square value of 3.044 revealed no significant difference and a contingency coefficient of 0.272 supported the no significant difference idea for combined responses from senior and junior colleges.

This section on Articulation Programs for Physical Science and Mathematics showed no complete agreement between the types of colleges on

TABLE 58

DISSEMINATION OF RESEARCH RESULTS BETWEEN INSTITUTIONS SHOULD FACILITATE ARTICULATION COMMUNICATIONS

Responses	Senior Colleges[a]		Junior Colleges		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	9	4	6	5	15	9
Probably	6	0	4	0	10	0
Seldom	2	6	6	6	8	12
No	1	7	0	2	1	9
Uncertain	4	5	0	3	4	8
TOTAL	22	22	16	16	38	38
Chi-Square =	1.365		0.069		1.096	
Contingency Coefficient =	0.242		0.066		0.167	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 59

ARTICULATION PROGRAMS SHOULD PROVIDE BUILT-IN PERIODIC EVALUATION OF THE ADEQUACY OF THE PROCEDURES INCLUDING THE EFFECTIVENESS OF TYPES OF PERSONNEL INVOLVED, APPROPRIATENESS OF THE PROBLEMS CONSIDERED, AND CONCRETE ACHIEVEMENTS ATTAINED

Responses	Senior Colleges[a]		Junior Colleges		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	10	1	7	6	17	7
Probably	6	2	6	0	12	2
Seldom	0	7	3	4	3	11
No	0	6	0	3	0	9
Uncertain	6	6	0	3	6	9
TOTAL	22	22	16	16	38	38
Chi-Square =	4.909		0.065		3.044	
Contingency Coefficient =	0.427		0.064		0.272	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

any of the eighteen statements. The calculations of data from the senior colleges showed significant differences for seven of the eighteen statements. Calculations for junior colleges showed no values indicating a difference.

Table 60 is a composition of all of the responses for this section. The chi-square values yielded 62.551 for senior colleges, 18.594 for junior colleges, and 77.618 for all colleges. When combined, these values showed a significant difference among the responses for each group. The corresponding contingency coefficients of 0.369 for senior colleges, 0.246 for junior colleges, and 0.319 for all colleges gave evidence of a low degree of difference for senior colleges and all colleges, and a negligible degree of difference for junior colleges.

V. EVALUATION FOR PHYSICAL SCIENCE AND MATHEMATICS

The following issues relate to evaluation:

1. What criteria should be used for the evaluation of an articulation program?

2. Who should develop the criteria?

3. What are the responsibilities of the state board of higher education relative to the articulation process?

4. How can the program be continuously updated?

Table 61 is a summary of the responses to the statement, "Guidelines from professional associations are used in developing clear criteria for evaluating transfer courses." The chi-square values for this table yielded 1.746 for senior colleges, 0.696 for junior colleges, and 2.330 for all colleges. These values revealed no significant difference among

TABLE 60

SUMMARY TABLE FOR ARTICULATION PROGRAMS FOR PHYSICAL SCIENCE AND MATHEMATICS

Responses	Senior Colleges		Junior Colleges		All Colleges	
	D.P.[a]	C.P.[b]	D.P.[a]	C.P.[b]	D.P.[a]	C.P.[b]
Yes	209	60	131	62	340	122
Probably	98	72	92	68	190	140
Seldom	19	123	50	77	69	200
No	10	73	8	40	18	113
Uncertain	60	68	7	41	67	109
TOTAL	396	396	288	288	684	684
Chi-Square =	62.551		18.594		77.618	
Contingency Coefficient =	0.369		0.246		0.319	

[a]Desired Practice.

[b]Current Practice.

P = 0.05.

TABLE 61

GUIDELINES FROM PROFESSIONAL ASSOCIATIONS ARE USED IN DEVELOPING CLEAR CRITERIA FOR EVALUATING TRANSFER COURSES

Responses	Senior Colleges[a]		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	7	2	6	3	13	5
Probably	11	6	8	6	19	12
Seldom	0	7	1	2	1	9
No	0	3	1	2	1	5
Uncertain	4	4	0	3	4	7
TOTAL	22	22	16	16	38	38
Chi-Square =	1.746		0.696		2.330	
Contingency Coefficient =	0.271		0.204		0.240	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

responses from each of these groups. The corresponding contingency coefficient values of 0.271 for senior colleges, 0.204 for junior colleges, and 0.240 for all colleges showed no significant difference.

Table 62 contains data provided by the statement, "Senior colleges, in conjunction with the state board of higher education, design and administer experiments for better articulation procedures." The chi-square values for Table 62 yielded 0.209 for senior colleges, 1.067 for junior colleges, and 1.612 for all colleges. These values revealed no significant differences of opinion among the responses of any group. The corresponding contingency coefficient values of 0.097 for senior colleges, 0.250 for junior colleges, and 0.202 for all colleges gave evidence of no significant difference.

Table 63 is a summary of the responses to the statement, "Representatives from professional organizations are used as consultants for initiating needed studies for the articulation procedures." This table yielded chi-square values of 0.209 for senior colleges, 0.119 for junior colleges, and 0.035 for all colleges. These values showed no significant difference. The corresponding contingency coefficient values of 0.044 for senior colleges, 0.086 for junior colleges, and 0.030 for all colleges also showed no significant difference.

Table 64 contains data from responses to the statement, "A standing committee composed of representatives from senior colleges, junior and/or community colleges, state higher education board, and state professional organizations periodically reviews articulation procedures of the participating institutions." The calculated chi-square values yielded 3.667 for senior colleges, 0.583 for junior colleges, and 3.606 for all

TABLE 62

SENIOR COLLEGES, IN CONJUNCTION WITH THE STATE BOARD OF HIGHER EDUCATION, DESIGN AND ADMINISTER EXPERIMENTS FOR BETTER ARTICULATION PROCEDURES

Responses	Senior Colleges		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	8	6	4	1	14	7
Probably	7	0	5	5	12	5
Seldom	2	4	3	4	5	8
No	1	5	1	2	2	7
Uncertain	4	7	3	4	7	11
TOTAL	22	22	16	16	38	38
Chi-Square =	0.209		1.067		1.612	
Contingency Coefficient =	0.097		0.250		0.202	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 63

REPRESENTATIVES FROM PROFESSIONAL ORGANIZATIONS ARE USED AS CONSULTANTS FOR INITIATING NEEDED STUDIES FOR THE ARTICULATION PROCEDURES

Responses	Senior Colleges		Junior Colleges[a]		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	8	6	2	3	10	9
Probably	7	0	8	0	15	0
Seldom	3	5	3	4	6	9
No	1	6	1	5	2	11
Uncertain	3	5	2	4	5	9
TOTAL	22	22	16	16	38	38
Chi-Square =	0.209		0.119		0.035	
Contingency Coefficient =	0.044		0.086		0.030	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

TABLE 64

A STANDING COMMITTEE COMPOSED OF REPRESENTATIVES FROM SENIOR COLLEGES, JUNIOR AND/OR COMMUNITY COLLEGES, STATE HIGHER EDUCATION BOARD, AND STATE PROFESSIONAL ORGANIZATIONS PERIODICALLY REVIEWS ARTICULATION PROCEDURES OF THE PARTICIPATING INSTITUTIONS

Responses	Senior Colleges[a]		Junior Colleges		All Colleges	
	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]	D.P.[b]	C.P.[c]
Yes	10	2	8	5	18	7
Probably	7	3	5	0	12	3
Seldom	1	6	1	3	2	9
No	0	2	1	2	1	4
Uncertain	4	9	1	6	5	15
TOTAL	22	22	16	16	38	38
Chi-Square =	3.667		0.583		3.606	
Contingency Coefficient =	0.378		0.188		0.294	

[a]Chi-square is marginally useful.

[b]Desired Practice.

[c]Current Practice.

P = 0.05.

colleges. Each of these values showed no significant difference. The corresponding contingency coefficient values were 0.378 for senior colleges, 0.188 for junior colleges, and 0.294 for all colleges. These values indicated a moderate degree of difference for senior colleges, and a negligible degree of difference for junior colleges and all colleges.

Table 65 is a summary of the responses to the statement, "The state board of higher education conducts conferences for the purpose of improving articulation procedures." This table yielded chi-square values of 1.198 for senior colleges, 0.254 for junior colleges, and 0.245 for all colleges. These values showed no significant difference for senior and junior colleges, or the combined colleges. The corresponding contingency coefficient values of 0.227 for senior colleges, 0.125 for junior colleges, and 0.080 for all colleges gave evidence of a negligible degree of difference for all groups.

Calculations for this section showed no significant difference for either junior or senior colleges, but one out of the five statements for all colleges had a significant difference.

Table 66, which is a compilation of all responses for this section, indicated a significant difference for senior colleges and all colleges with chi-squares of 4.146 and 9.340. The junior colleges had a chi-square of 2.976, which indicated no significant difference. The corresponding contingency coefficient values were 0.190 for senior colleges, 0.189 for junior colleges, and 0.216 for all colleges. These values indicated no significant difference.

TABLE 65

THE STATE BOARD OF HIGHER EDUCATION CONDUCTS CONFERENCES FOR THE PURPOSE OF IMPROVING ARTICULATION PROCEDURES

Responses	Senior Colleges		Junior Colleges		All Colleges	
	D.P.[a]	C.P.[b]	D.P.[a]	C.P.[b]	D.P.[a]	C.P.[b]
Yes	11	6	6	8	17	14
Probably	5	0	7	0	12	0
Seldom	3	8	3	4	6	12
No	0	5	0	3	0	8
Uncertain	3	3	0	1	3	4
TOTAL	22	22	16	16	38	38
Chi-Square =	1.198		0.254		0.245	
Contingency Coefficient =	0.227		0.125		0.080	

[a]Desired Practice.

[b]Current Practice.

P = 0.05.

TABLE 66

SUMMARY TABLE FOR EVALUATION FOR PHYSICAL SCIENCE AND MATHEMATICS

Responses	Senior Colleges		Junior Colleges		All Colleges	
	D.P.[a]	C.P.[b]	D.P.[a]	C.P.[b]	D.P.[a]	C.P.[b]
Yes	43	19	30	16	73	35
Probably	39	11	30	16	69	27
Seldom	6	25	10	14	16	39
No	3	22	4	13	7	35
Uncertain	19	33	6	21	25	54
TOTAL	110	110	80	80	190	190
Chi-Square =	4.146		2.976		9.340	
Contingency Coefficient =	0.190		0.189		0.216	

[a]Desired Practice.

[b]Current Practice.

P = 0.05.

VI. SUMMARY

Five categories were examined for significant or nonsignificant differences relative to current practices and desired practices in the articulation process between the junior and senior colleges of Arkansas. Two of eleven items on the section on Admissions for Physical Science and Mathematics indicated a significant difference. This showed that, in general, key agents agreed that desired practices and current practices were similar.

The section, Evaluation of Transfer Courses for Physical Science and Mathematics, indicated that six of the eighteen items had differences in the opinion of the key agents for senior and junior colleges. The statements showing significant differences were not parallel for the two types of colleges in all instances, but generally the same concerns were evident.

Four of the nine statements in the section on Curriculum Planning for Physical Science and Mathematics showed significant differences for the senior colleges and three of the nine statements showed significant differences for the junior colleges. This indicated that a majority of the key agents had no significant differences of opinion concerning desired practice and current practice for this category.

In the section on Articulation Programs for Physical Science and Mathematics, seven of the eighteen statements had no significant difference for senior colleges. The junior colleges, on the other hand, had no significant difference for all of the items. This section, in general, indicated no differences in the desired and current practices.

In the last section, Evaluation for Physical Science and Mathematics, the analysis revealed no significant differences in the opinion of key agents of both senior and junior colleges. This indicated a general agreement by personnel from both types of colleges on evaluation.

CHAPTER V

SUMMARY AND CONCLUSIONS WITH RECOMMENDATIONS

I. SUMMARY

This study collected, examined, and analyzed data relative to the articulation process between junior and senior colleges within the state of Arkansas. The data included opinions of key agents of Arkansas colleges as to whether current practices (actual procedures and policies being used in the articulation process) and desired practices (ideal procedures and policies for the articulation process) are the same or similar. Key agents responded to a questionnaire formulated from Guidelines developed by the Joint Committee on Junior and Senior Colleges.

The Physical Science and Mathematics disciplines were emphasized in this research. Information acquired from this study should create an awareness of articulation problems as they relate to the Physical Sciences and Mathematics and help to resolve problems of transfer.

The population for this study consisted of the thirty-two colleges within the state of Arkansas. The University of Arkansas' Medical Sciences Division at Little Rock was not used because of its special admissions and transfer policies. There are eighteen senior colleges and fourteen junior and/or community colleges within the state. Thirty-eight percent of the senior colleges have enrollments greater than 4,000. Sixty-four percent of the junior colleges have enrollments of less than 1,000. None of the latter had enrollments greater than 3,000.

Sixty-one statements were developed to gather information for the five sections included in the questionnaire. A chi-square was calculated for each of these statements. A two by two table was formed from the frequencies of responses to desired practice and current practice as horizontal variables, and "yes" and "not yes" as vertical groupings. A chi-square indicating a significant difference was interpreted as showing a difference between desired practice and current practice. A no significant difference was interpreted as an indication of no difference between desired and current practice. Contingency coefficients were calculated for each chi-square value to ascertain the degree of difference.

This study proposed to answer the following questions:

1. Do key agents of Arkansas colleges have similar views about admissions criteria?

2. Are there differences in the opinion of key agents of Arkansas colleges as to how transfer credit for Physical Science and Mathematics can be evaluated?

3. Is there general agreement among key agents of Arkansas colleges relative to use of achievement tests, GPA, and previous performance for placement of transfer students?

4. What differences are there in the opinion of key agents of Arkansas colleges concerning joint planning for Physical Science and Mathematics?

5. Is there general agreement as to how curriculum changes for Physical Science and Mathematics may be initiated?

6. Do key agents of Arkansas colleges generally agree on the composition of the body responsible for developing articulation procedures?

The following section answers the questions presented in the section of Chapter I—Purpose:

1. The study revealed that key agents of Arkansas colleges held similar views about admissions criteria. These views indicated that key agents did not consider as a desired practice the ideas proposed by the Joint Committee's Guidelines concerning specific GPA and specific number of credits as a prerequisite to upper division admissions standing, and admission of transfers from unaccredited junior colleges.

2. Key agents of Arkansas colleges differed in their opinions as to how transfer credits for Physical Science and Mathematics can be evaluated.

3. There was general agreement relative to the use of achievement tests, GPA, and previous performance for placement of transfer students.

4. There were no differences in the opinion of key agents of Arkansas colleges concerning joint planning for Physical Science and Mathematics course content. They agreed that cooperative planning was a desired practice but was not being done.

5. There was general agreement among key agents of Arkansas colleges as to how curriculum changes for Physical Science and Mathematics may be initiated.

6. There was no general agreement among key agents of Arkansas colleges on the composition of the body responsible for developing articulation procedures. Responses from both types of colleges indicated that the composition of the body suggested in Guidelines was undesirable.

II. CONCLUSIONS

The following conclusions were based on the findings of this research:

1. Better academic counseling in each of the junior and senior colleges would minimize academic and other related problems encountered by transfer students in Physical Science and Mathematics.

2. Statewide cooperative planning by all junior and senior college personnel in Arkansas for academic programs in Physical Science and Mathematics at the freshman and sophomore levels would make evaluation of transfer courses more efficient.

3. The problems associated with transfer credits for Physical Science and Mathematics students can be minimized substantially through the process of joint planning by representatives from both junior and senior colleges.

III. RECOMMENDATIONS

The following recommendations were based on the data gathered in this study and the related literature. They were made to assist junior and senior colleges in improving the articulation process for Physical Science and Mathematics:

1. Junior and/or community colleges and senior colleges should develop procedures for special academic counseling for transfer students. In the development of these procedures, representatives from the Physical Science and Mathematics departments should be included.

2. A committee composed of representatives of the faculty from the departments of Physical Science and Mathematics, admissions office, and state board of education should develop criteria for evaluating courses.

3. Junior and/or community colleges and senior colleges should develop agreements as to what courses can or cannot be used for degree requirements.

4. Junior and/or community colleges and senior colleges which have a number of students transferring from one college to the other should develop a system of communication for announcing curriculum changes.

5. A committee composed of faculty members from the Physical Science and Mathematics departments of both types of colleges should be formed for the purpose of identifying common curriculum concerns and making some recommendations about their solution.

6. The state board of higher education should initiate a series of workshops and/or conferences to review and discuss matters relating to the articulation process.

Some problem areas for further research which have been suggested from this study are:

1. A comparative study of the admission procedures in Arkansas colleges relative to transfer students;

2. A comparative study of the goals and the specific content of topics covered in Physical Science and Mathematics courses at the freshman and sophomore levels; and

3. A study to compare the career choices, attrition rate, and anxiety level of students enrolled in programs characterized by highly organized academic counseling as opposed to those with little or no counseling programs in Physical Science and Mathematics.

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APPENDIXES

APPENDIX A

SURVEY INSTRUMENT AND ACCOMPANYING LETTER

Articulation for Physical Science and Mathematics
in Arkansas Colleges and Universities

Please indicate your opinion of what your institution should practice (ideal role) and what it does practice (actual role) in regards to Physical Science and Mathematics. Check in appropriate columns. The response categories mean:

Current Practice

5 - yes	Statement is customarily followed.
4 - probably	Statement is followed under most circumstances.
3 - seldom	Statement is inconsistent with school practices under most circumstances.
2 - no	Statement is definitely not followed.
1 - uncertain	Respondent is undecided as to whether statement is followed.

Desired Practice

5 - yes	Statement is definitely desirable.
4 - probably	Statement is desirable under most circumstances.
3 - seldom	Statement is not desirable under most circumstances.
2 - no	Statement is definitely not desirable.
1 - uncertain	Undecided as to desirability of statement.

Admissions for Physical Science and Mathematics	Current Practice					Desired Practice				
	yes	probably	seldom	no	uncertain	yes	probably	seldom	no	uncertain
	5	4	3	2	1	5	4	3	2	1
1. Public four-year Colleges and Universities should accept a transfer student with an overall C average.										
2. Transfer students who have relatively poor performance in areas of Mathematics and Physical Science should have special academic counseling.										
3. More uniform procedures should be used in the counseling of prospective students.										
4. Academic performance in a Junior and/or Community College is the best single predictor of success in a four-year institution and should count most heavily in the Admissions decisions.										

	Current Practice					Desired Practice				
	yes 5	probably 4	seldom 3	no 2	uncertain 1	yes 5	probably 4	seldom 3	no 2	uncertain 1
5. Students previously denied admission to a Senior College due to low grades in high school should be allowed to transfer to Senior College upon satisfactory performance in Junior and/or Community College.										
6. A specific GPA in the areas of Physical Science and Mathematics is expected for students transferring with upper division standing.										
7. A specific number of credits in Physical Science and Mathematics must be required for transfer students to be admitted to upper division standing.										
8. Aptitude and Achievement test scores would be useful to counselors and faculty advisors in assisting transfer students to make wise decisions about programs.										
9. Junior and/or Community College students should complete their program before transfer.										
10. The requirement of an associate degree as a condition for transfer appears to unduly restrict the mobility of good students between Junior and/or Community and Senior College.										
11. Transfer applicants from unaccredited Junior and/or Community Colleges should be admitted on the same basis as applicants from regionally accredited colleges until such time as regular accreditation has been achieved.										
Evaluation of Transfer Courses for Physical Science and Mathematics										
1. Potential transfer students should be informed as to the precise evaluation of their application as soon as possible within a period of 15 days after receipt of application.										
2. All courses taken at the Junior and/or Community College should be a part of the student's record and should be used in advising and evaluating the student's program										

		Current Practice					Desired Practice				
		yes	probably	seldom	no	uncertain	yes	probably	seldom	no	uncertain
		5	4	3	2	1	5	4	3	2	1
3.	The satisfactory completion of an associate degree transfer program should guarantee upper division standing.										
4.	Junior and/or Community College credit equal to half the baccalaureate degree program credit should be accepted to fulfill requirements for the degree.										
5.	The amount of credit normally earned by resident students in Physical Science and Mathematics during their first two years may serve as a guide in allowing transfer credit.										
6.	Physical Science and Mathematics credits should be given for all Junior and/or Community College courses which satisfy baccalaureate degree requirements regardless of any restriction on the amount of credit transferred.										
7.	Students should be allowed to take electives or advanced courses in Physical Science and Mathematics for satisfying program requirements for the degree if their transfer credits indicate satisfaction of all lower level courses.										
8.	Grades of D earned by transfer students should be evaluated in the receiving institution on the same basis as D grades earned by resident students at that institution.										
9.	Transfer students may be advised to repeat courses without credit if their mastery of the subject matter content is considered										
10.	Transfer students may reasonably be asked to take achievement examination for the purpose of placing them at the appropriate level in various sequences of Physical Science and Mathematic courses.										
11.	Examination results may be used as a basis for awarding credit or for waiver of degree requirements for Junior and/or Community College courses which might not otherwise transfer.										

		Current Practice					Desired Practice				
		yes	probably	seldom	no	uncertain	yes	probably	seldom	no	uncertain
		5	4	3	2	1	5	4	3	2	1
12.	Each Senior Institution should work with the Junior and/or Community Colleges from which it receives sizable numbers of transfers to identify those Physical Science and Mathematics courses that are parallel or equivalent for transfer										
13.	Representatives from both Senior Institutions and Junior and/or Community Colleges should review annually courses offered by the two types of institutions for which students will expect to receive transfer credit.										
14.	Senior Institutions with specific requirements in the areas of Physical Science and Mathematics for college entrance at the freshman level should make these known to Junior and/or Community Colleges from which they expect transfer students.										
15.	Agreements concerning parallel and equivalent courses from Junior and/or Community Colleges and Senior Colleges should be communicated in writing to the appropriate personnel.										
16.	Junior and/or Community Colleges and Senior Colleges should plan together for gifted high school students to insure that credit earned before high school graduation will be accepted by both types of institutions.										
17.	The conditions under which credit is given to gifted high school students by institutions of higher education while they are still in high school should be clearly understood by the high school, the College, and the students involved.										
18.	Junior and/or Community Colleges and Senior Colleges should review and evaluate all special and/or remedial programs for the areas of Physical Science and Mathematics within the institutions and make agreements as to how these courses may fit into transfer credit.										

Curriculum Planning for Physical Science and Mathematics	Current Practice					Desired Practice				
	yes 5	probably 4	seldom 3	no 2	uncertain 1	yes 5	probably 4	seldom 3	no 2	uncertain 1
1. Transfer students should be given the option of satisfying graduation requirements which were in effect in Senior Colleges at the time they enrolled as freshmen.										
2. Senior Institutions should notify the Junior and/or Community Colleges as early as possible of impending curriculum changes which may affect transfer credits.										
3. Junior and/or Community Colleges should advise the Senior Institutions of proposed changes in their courses.										
4. When a change made by the Senior Institution necessitates some type of change in the Junior and/or Community College, sufficient lead time should be given to effect the change with a minimum of disruption.										
5. Faculty members from the two types of Colleges should work together to identify Common Curriculum Concerns and experiences which may be built into their respective Programs.										
6. Flexibility in Curriculum matters should be strongly encouraged so that students who have been diverted to the institution of their second or third choice will not be delayed by differing requirements in completing their degree programs.										
7. If the work of Junior and/or Community College students is outstanding, the Senior College should make every effort to have them participate in Advanced or Honor Programs after transfer.										
8. Junior and/or Community Colleges have the responsibility to identify and attempt to develop latent talent which did not manifest itself in academic achievement during high school.										
9. Junior and/or Community College students with outstanding academic records should be allowed to participate in Senior College Honor Programs after transfer.										

Articulation Programs for Physical Science and Mathematics	Current Practice					Desired Practice				
	yes 5	probably 4	seldom 3	no 2	uncertain 1	yes 5	probably 4	seldom 3	no 2	uncertain 1
1. Articulation activities should involve representatives from high schools, the two types of Colleges, State Departments of Education, Coordinating Agencies of subject areas, and Professional Associations										
2. Faculty members, counselors, admissions officers, registrars, research workers, deans, presidents, and students should be involved in articulation agreement.										
3. Administrators at the policy-making level should review and approve agreements made by departments or program specialists.										
4. Representation from each segment or sector of education must be involved if articulation agreements are to be meaningful.										
5. Junior and/or Community Colleges and Senior Colleges should establish procedures for identifying problems.										
6. Junior and/or Community Colleges and Senior Colleges should establish means for effective communication between themselves.										
7. Junior and/or Community Colleges and Senior Colleges should have established procedures for initiating needed studies for articulation.										
8. Junior and/or Community Colleges and Senior Colleges should have procedures for proposing solutions to subject-matter area problems.										
9. Junior and/or Community Colleges and Senior Colleges should have established procedures for ratifying and implementing agreements which affect the transfer credits.										
10. Articulation machinery should be voluntary with respect to specific procedures for reaching agreements between the two types of Colleges.										
11. In addition to some overall Administrative Coordination, Committees should be employed for the solution of specific problems.										

	Current Practice					Desired Practice				
	yes 5	probably 4	seldom 3	no 2	uncertain 1	yes 5	probably 4	seldom 3	no 2	uncertain 1
12. A Standing Committee should be established with representatives from the two types of Colleges for considering problems.										
13. State and regional conferences should be held to review matters in which there is broad interest.										
14. Articulation procedures between institutions should include visits between campuses by college personnel and students, interchange of newsletters, and other similar expressions of cooperative planning.										
15. Institutional articulation should provide means for interviews between transfer students and their former advisors and instructors.										
16. Articulation communication should include inter-campus visitation of faculty.										
17. Dissemination of research results between institutions should facilitate articulation communications.										
18. Articulation programs should provide built-in periodic evaluation of the adequacy of the procedures including the effectiveness of types of personnel involved, appropriateness of the problems considered, and concrete achievements attained.										
Evaluation for Physical Science and Mathematics										
1. Guidelines from professional associations are used in developing clear criteria for evaluating transfer courses.										
2. Senior Colleges, in conjunction with the State Board of Higher Education, design and administer experiments for better articulation procedures.										
3. Representatives from professional organizations are used as Consultants for initiating needed studies for the articulation procedures.										

	Current Practice					Desired Practice				
	yes 5	probably 4	seldom 3	no 2	uncertain 1	yes 5	probably 4	seldom 3	no 2	uncertain 1
4. A Standing Committee composed of representatives from Senior Colleges, Junior and/or Community Colleges, State Higher Education Board, and State Professional Organizations periodically reviews articulation procedures of the participating institutions.										
5. The State Board of Higher Education conducts conferences for the purpose of improving articulation procedures.										

KNOXVILLE COLLEGE

UNDER AUSPICES OF THE BOARD OF NATIONAL MISSIONS
UNITED PRESBYTERIAN CHURCH IN THE UNITED STATES OF AMERICA
KNOXVILLE, TENNESSEE 37921

NATURAL SCIENCE & MATHEMATICS

June 5, 1980

As a staff member at the University of Arkansas at Pine Bluff, my duties as Director of Cooperative Education made me aware of the many problems concerning Articulation of Physical Science and Mathematics. A major part of my work in completing the Doctorate degree involves conducting a study on "The Articulation For Physical Science and Mathematics In Arkansas Colleges and Universities."

In a correspondence from Dr. Gary Chamberlin, Department of Higher Education, I learned that Arkansas has some activity taking place in the Articulation Process. The result of my study should be of benefit to various institutions of Higher Education.

Your response to this questionnaire, which requires approximately fifteen minutes of your time, is essential since information from all schools is needed for a valid analysis. I have included a self-addressed envelope to facilitate a speedy reply. A summary of the study will be sent to you upon completion.

I shall look forward to hearing from you at your earliest convenience as I hope to begin my analysis by June 25, 1980.

Thank you for your assistance and cooperation.

Sincerely,

Trenton Cooper

APPENDIX B

CORRESPONDENCE CONCERNING STUDY

DEPARTMENT OF HIGHER EDUCATION
1301 WEST SEVENTH STREET
LITTLE ROCK, ARKANSAS 72201

BILL CLINTON
GOVERNOR

T. MICHAEL ELLIOTT
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371-1441
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October 23, 1979

Mr. Trenton Cooper
Visiting Professor of
Mathematics and Physics
Knoxville College
Knoxville, Tennessee 37921

Dear Mr. Cooper:

Mr. Truett Goatcher of the Department of Education recently forwarded your letter concerning articulation to this department.

As you have probably found, the problem of transfer and articulation between colleges, and especially between two-year and four-year colleges, seems to persist as a problem in spite of major efforts. Arkansas is no exception. Over the past four or five years, chief academic officers and our staff have continued to work on improvements in transfer and articulation. Some improvements have been developed and the problem between two-year and four-year institutions located near one another is often not so great. The Department of Higher Education is involved in some recent activities in this area that we hope will significantly improve student transfer. The Deans of Colleges of Education and two-year academic deans have been working toward a transfer agreement for those students planning a career in teaching and have made considerable progress. Some work remains before a final document will be completed. At a meeting held on October 19, 1979, the State Board of Higher Education authorized the establishment of a Task Force on Transfer and Articulation which will begin work in the near future and I will be chairing that task force. As far as physics and chemistry, no specific action has taken place thus far in those disciplines.

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All this is to say we have little formal development to offer you at this time but there is a good deal of activity that has taken place recently. Hopefully I will be able to report much accomplishment in another year.

Sincerely,

Gary D. Chamberlin
Deputy Director

GDC/go
cc: Truett Goatcher

State of Arkansas
DEPARTMENT OF EDUCATION
STATE EDUCATION BUILDING
LITTLE ROCK, ARKANSAS 72201

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TELEPHONE
371-1461

October 5, 1979

Mr. Trenton Cooper
Visiting Professor of Mathematics
and Physics
Knoxville College
Knoxville, Tennessee 37921

Dear Mr. Cooper:

Mr. Elbert Hardcastle in our Public Information Office has asked me to respond to your request for information about articulation between two and four year colleges. First, I must indicate to you that the Arkansas Department of Education only deals in a direct way with elementary and secondary schools. Your best response for this information would be from the Department of Higher Education, whose offices are located at 1301 West 7th Street, in Little Rock.

I would make this observation based on my experience in dealing with mathematics and science teachers throughout the state. I know of no organized program of communication to coordinate programs between the two and four year colleges. There are some reciprocal agreements, most of which are worked out on an individual basis.

I hope this information is helpful to you.

Sincerely,

Charles D. Watson

Charles D. Watson, Specialist
Mathematics and Science

CDW:kd

cc: Elbert Hardcastle

"AN EQUAL OPPORTUNITY EMPLOYER"

VITA

Trenton Cooper was born to George and Ethel S. Cooper in Hope, Arkansas, on March 11, 1923. He attended elementary school in that city and was graduated from Yerger High School in May 1941.

In 1946, after a tour of duty in the United States Navy, he entered Arkansas AM & N College (now the University of Arkansas at Pine Bluff). He received a Bachelor of Science degree in mathematics education in 1950. The Master of Science in Natural Science was obtained from Oklahoma State University in 1959. In 1964, he received the Master of Public Health in Radiological Health from the University of Minnesota. He began his Doctoral studies at The University of Tennessee in 1978, and received the Doctor of Education in Curriculum and Instruction in August 1981.

The author's educational involvement includes several years as a high school mathematics teacher in the public schools of Arkansas and Oklahoma, an instructor of mathematics and physics at Southern University, and Assistant Professor of Mathematics and Physics at Knoxville College.

During his tenure at Knoxville College, he also served as Director of Freshman Studies and Director of Cooperative Education. In 1975, he became Director of Cooperative Education at the University of Arkansas at Pine Bluff, and is currently Assistant Professor of Secondary Education at the same institution.

Trenton Cooper is a member of the Alpha Kappa Mu Honor Society, the Phi Delta Kappa, and the Arkansas Education Association.

He is married to the former Gwendolyn Manning of Hugo, Oklahoma. They have two daughters, Edris and Adrienne.