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Vision and learning: A survey of what education students and professors know about these two processes and how they interrelate

Abstract

Vision and learning: A survey of what education students and professors know about these two processes and how they interrelate

Degree Type

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Committee Chair

Paul Kohl

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Vision and Learning: A Survey of What Education Students and Professors Know About These Two Processes and How They Interrelate.

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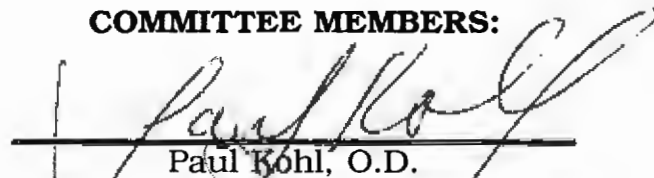
PRESENTED BY:

William F. Hefner, O.D.


In partial fulfillment for the Master of Education,
Visual Function in Learning
at Pacific University

15 April 1997


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INTRODUCTION

Your eight year old child has just been diagnosed with a learning disability. What do you do? Who can you turn to? Are you sure all possible explanations of his/her learning disability have been explored? There may be a chance that unless a functional optometric consultation was obtained, or the school counselors, teachers and/or psychologists who provided the evaluation have received special exposure to the area of vision and learning, your child may not have had the benefit of a comprehensive workup regarding his/her learning difficulties.

It has been estimated that between 75 and 90% of all classroom learning comes to the student via the visual pathway.¹⁻⁴ In fact, it has been stated that approximately three quarters of all children have identifiable, quantifiable vision problems by the time they enter junior high school.² The tremendous reliance upon the visual system (at least in sighted children) in the learning process has been amplified by the number of studies done on the relationship between the two. For example, Hoffman⁵ found in his 1974 study of kindergarten students that there was a correlation of 0.79 between visual skills tests and the total scores on the Metropolitan Readiness Test. In another study involving 227 seven year old second grade students, it was established that just over 16% had quantifiable vision problems ranging from substandard distance visual acuity to abnormal fixation disparity to uncorrected refractive error. Interestingly, this group of children also scored significantly worse than other children on standardized educational tests.⁶ A 1991 study of an adolescent population (ages fourteen to nineteen years) found that of the 625 students given a visual screening, 52.3% failed to meet the pass criteria.⁷ In another study involving 117 adult students enrolled in

the New York City Developmental Agency's literacy program, 66% of the students failed to pass the New York State Optometric Association Vision Screening Battery (NYSOA).⁸ The implication from these two studies, along with numerous others with similar results, is clear; children with vision problems often have difficulty learning in school.⁹⁻¹³ These children may become so frustrated by their problems that they become disruptive in class, drop out of school, develop learned helplessness or in some cases even become juvenile delinquents.¹⁴ This attitude of frustration and/or indifference toward learning is what has ultimately provided our society with an estimated forty million people that are unable to read, write, speak or compute in an effective manner.^{8,10,15}

In 1989 approximately 2 million children received special services for learning disabilities. This number represented just about 100,000 persons, or 5% of the general school population. Further, it is estimated that 75% of those students identified as learning disabled had a primary deficit in reading.^{9,15,16} However, because reading is such a complex task, it has proven impossible to establish a direct cause of reading disabilities.¹⁷ As a result, a number of studies have been undertaken in an effort to explore the relationship between reading ability/disability and various factors.^{10-13, 34,40,42,43} An excellent example of the complex interplay of factors that may lead to a reading disability is Worrall's¹⁸ 1986 study. He finds that reading disabilities are frequently the result of poor interactions between the under developed language system, auditory system and visual system. Based on this information, he proposes the idea that a rapid automatic naming deficit or a rapid automated sequencing problem are more frequently the culprits preventing a child from learning to read effectively.

One area of intense interest and study for many years now has been the relationship between vision and learning. In fact, the influence of binocular vision defects on reading and learning has been the subject of great debate for several years now.¹⁹ On the one end of the spectrum, there are those, mostly within the profession of ophthalmology, who have argued that vision defects play minimal roles in delaying a child's mastery of the reading process.²⁰⁻²⁵ This sentiment was displayed by the American Academy of Ophthalmology's 1981 policy statement on the relationship between vision, dyslexia and learning saying: "Although eyes are necessary for vision, the brain encodes information resulting in 'visual perception.' Attention directed to the eyes would not be expected to have any effect on the brain's processing of visual stimuli."²⁰ In a study supporting this view, Helveston et al ²⁵ found that reading was not positively related to visual function in his study of 1,910 first, second and third grade students. Interestingly, though, he de-emphasized the fact that there was indeed a statistically significant relationship between poor reading ability and visual perception problems, a relationship that has been advocated as a contributory component in many specific reading disabled children.¹⁹

On the other end of the spectrum, optometrists and a number of educators strongly believe vision plays a large role in the reading process. There are many studies in the literature citing a positive relationship between poor visual skills and poor reading abilities.^{16,19,26-43} Koslowe¹⁹ found that failure on the modified clinical technique (a slightly more comprehensive vision screening than is typically used) was significantly related to below average performance in the classroom. In addition, he found that failure on the vision screening and poor academic performance were significantly related to failure on a modified version of the coding subtest of the WISC-R.

In a separate study by Rosner and Rosner¹², it was found that refractive error definitely plays a role in learning disabilities, especially reading disabilities. In their study of 712 children, ages 6 to 12 years, they discovered that only 18% of moderately hyperopic individuals displayed age appropriate visual perceptual skills, while 74% of moderate myopic and emmetropic individuals possessed age appropriate visual perceptual skills. Other studies cite visual deficit reasons ranging from poor fusional vergence ranges to phoric posture to anisometropia to inadequate saccadic eye movements as possible causes of reading disabilities.^{11-13,38-45} It should be pointed out that although there is strong evidence to support the theory that visual difficulties contribute to learning disabilities, many sources, including optometric and educational are of the opinion that vision *should not* be considered the sole reason behind a learning disabled child's poor performance, rather it should be thought of as a contributory component.^{16,26-45}

Definitively answering the question "Do vision problems cause reading difficulties?" leaves the investigator somewhat unsatisfied. As one author stated: "As with most cause-effect relationships, vision problems are neither a necessary nor a sufficient cause of reading disability."²³ If, however, one modified the question to read "Do vision problems, independent of other factors, cause reading difficulties?", the answer becomes an emphatic 'NO!' Vision disorders often accompany other developmental, physical, speech-language or auditory processing problems in the learning disabled individual. These individuals should not be treated as a bag of organs, a pair of ears or two eyes on a stick, rather they should be treated as a whole. Their disability is often complex and demands an integrative approach from several professionals. Doesn't it make logical sense that identification and elimination of *any* obstacle to easier more fascile learning be pursued? As

Helveston et al²⁵ so eloquently stated: "Education is a multifaceted process which includes opportunity, environment, curriculum, teaching effectiveness, parental support, innate abilities and physical factors. If deficiencies exist in any of these areas, a child's education may be compromised." It seems that this insight should provide a framework within which to work. By addressing each one of these issues individually, we should be able to ensure that every child is provided with the same opportunity to learn. This is where an auditory screening, speech-language evaluation, physical examination and comprehensive, functional vision screening for every school-aged child needs to be implemented.

While it is true that auditory, speech-language, physical and vision screening are readily available, few yield truly useful results simply because they test for the wrong defects. For example, most auditory screenings include tone presentations as opposed to tests that more closely approximate auditory discrimination as would be needed in a classroom setting. Similarly, vision screenings are typically designed to screen for the *wrong* deficit. Most vision screenings are centered around the Snellen distance visual acuity measure which, as we shall find later, usually identifies that group of children least likely to experience difficulty in learning to read. Certainly every effort should be made to obtain reasonable, useful results from these screenings, most especially the vision screening; don't forget, 75 to 90% of classroom learning comes to the student via the visual pathway.¹⁻⁴ When discussing the need for more complete, functional vision screenings, it is interesting to note that only about 31% of children between the ages of six and sixteen years and only about 14% of children under the age of six years are likely to receive a vision exam.⁴⁶ With this small percentage of school age children receiving comprehensive vision care, the necessity of a thorough

screening is emphasized. Why do so few children receive complete vision care? Perhaps it's because most people assume that visual difficulties will manifest themselves in a myriad of observable signs such as squinting, head tilting and turning, eye turns, rubbing reddened eyes, or covering an eye when engaging in a visually demanding task. But there exists an inherent flaw in this line of reasoning. Adaptations *may not* be observable until the child has been forced to cope with a visual problem for some time. By the time professional help is sought, the maladaptive behavior may have become so ingrained that the cause of the problem may be more difficult to treat. It is worth noting that many of the early signs of poor visual behavior can point to an undiagnosed vision problem IF one knows what to look for.

Since so few children receive care from a vision professional, who then is in the best position to make observations of a child's visual behavior? The logical answer is the child's classroom teacher. Because the educator frequently spends a greater portion of the day with a child than do their own parents, it is obvious that the classroom teacher is in a unique position to make observations of a child's visual behaviors and resultant performance. A 1972 article that appeared in the *Journal of Learning Disabilities* said it best: "The classroom teacher is afforded an excellent and unique opportunity to note slight deviations in the behavior of children which may be precursors of greater problems."⁴⁷

But are educators educated about vision? Are they aware of some of the more common signs and symptoms of a child who is struggling with an uncooperative visual system? How often do educator's consider the possibility of poor visual skills with a child who is labeled as having a behavior disorder, emotionally disturbed or learning disabled? Should educators be expected to have knowledge about signs and symptoms of vision

problems that could potentially hinder the learning process? In order to answer these questions, it is imperative to first gain an understanding of what education means.

Webster's dictionary defines education as: "The process of training and developing the knowledge, skill, mind, character, etc., by formal schooling; teaching; training."¹⁷ By definition, then, an educator is one who teaches the process of gaining and utilizing knowledge. But what happens when a child falls behind in his school work for no explicable reason? The educator finds his or herself needing to rely on various, often imaginative forms of teaching in order to help this child attain the knowledge base necessary for success. In some cases, the learning challenged student will find his/her way into a special education class, a resource center, or to an individual tutor. In these settings, the child typically works on the area(s) of greatest difficulty. For example, a child with a reading disability may be prescribed remediation activities such as cloze, sight word recognition, oral reading for fluency, silent reading for comprehension, oral reading for comprehension, echo reading, paired reading, and various forms of writing.⁴⁹ Of course these are just a few examples of hundreds of other remedial methods educators use; a comprehensive listing is beyond the scope of this paper. Because teaching defines the scope of what educator's do, it would be wrong for the public to expect a child's classroom teacher to address the *cause* of a vision impairment, or to suggest possible treatments. An educator typically has more than enough to do, without the additional burden of treating vision difficulties. This isn't to say, however, that educators shouldn't at least be familiar with some of the signs and symptoms associated with learning related vision problems. There are numerous resources readily available to

educators that describe various visual difficulties and common adaptive techniques youngsters will make.^{27,47,50,51}

Why is it so imperative that Kansas educators have a familiarity with symptoms and behaviors associated with vision problems? If one considers the minute amount of 'vision' actually required to be tested by the Kansas state law, the answer becomes readily apparent. The following law applies to all public, private and parochial schools.

K.S.A. 72-5204. VISION TESTING OF PUPILS DEFINITIONS. As used in this act: (a) "School board" means the governing body of any school; (b) "school" means all elementary and high schools; (c) "basic vision screening" means an eye testing program for each child based on a test chart which is graduated as to size of symbols, or the so-called Snellen Test, or any other system or method of testing equal thereto or better in the judgment of the school board.⁵²

K.S.A. 72-5205. SAME: BASIC VISION SCREENING IN SCHOOLS; REPORT. Each school board shall provide basic vision screening without charge to every pupil in its school not less than once every two (2) years. All such tests shall be performed by a teacher or some other persons designated by the school board. The results of the test and, if necessary, the desirability of examination by a qualified physician or optometrist shall be reported to the parents or guardians of such pupils: Provided that the information so reported shall not show preference in favor of any such professional person.⁵²

In essence, the Kansas state law considers the Snellen visual acuity test at distance to be an adequate vision screening. This idea is archaic when one considers the abundance of research refuting the efficacy of using distance visual acuity to detect vision disorders that may interfere with the learning process in a school age population.^{40-42,53,54} In his four year longitudinal study of first, fifth and ninth graders, Kelley⁵³ provides results that typify the visual changes students go through during their formal educational years. He found that the more advanced a child was in their academic career, the more likely they were to be myopic or near-sighted. The hypothesis being that as the amount of reading increases, a child becomes less hyperopic, or far-sighted, and more myopic as a function of their working distance changing

from twenty feet to eighteen inches. More importantly, though, he discovered that 'retarded readers' were more often hyperopic than myopic, which he interpreted as meaning there was not enough adaptation to the demands of a nearpoint environment. By definition, hyperopia means that one sees targets more easily at a distance than at near. Will a distance visual acuity measurement, as mandated by the state of Kansas, identify those individuals most at risk for delayed or problematic reading? This author's response is an emphatic "NO!"

What are some of the implications of this inadequate vision screening for the classroom teacher. One result of this impotent screening is that the classroom teacher may be saddled with the burden of trying to teach a child to read who's visual system may not be appropriately adapted to the task. A continuous struggle between the student and his/her poor visual system could lead to feelings of hopelessness, despair or possibly even distracting behavior. Another result of this state mandated 'screening' is that the teacher must now become more adept at identifying those children with the more subtle symptoms and behaviors indicative of an uncooperative visual system in order to "catch" those children with visual problems who may have passed the outdated distance visual acuity screening.

Another problem with the Kansas state law regarding vision screenings exists when it is stated: "...all such tests [vision screenings] shall be performed by a teacher or some other person designated by the school board."⁵² This law mandates that either the classroom teacher, who is already overwhelmed by larger class sizes, smaller resource pools and fewer classroom aides or a designee of the school board administer the "vision screening." For argument's sake, let's just say that teachers or designees had the opportunity to administer the Snellen distance visual acuity test. Would

the examiner be aware of the test's pitfalls? For example, would they know to cover the student's "poorer" eye first in order to minimize memorization of the chart? Would they know how bright the test room should be? And what about all the kids standing in line waiting their turn, listening to the students ahead of them calling out all the letters? If these variables aren't controlled, it is conceivable, and not improbable, that a child with a 'blind eye' could pass this type of vision screening. Certainly if a child with a 'blind eye' could pass the state mandated distance visual acuity screening, subtle, more significant visual defects such as eye teaming, accommodative, fusional, vergence, perceptual and eye movement problems would never be detected by the vision screening required by KSA 72-5204 and KSA 72-5205.

Are classroom teachers familiar enough with vision as it relates to the learning process to make judgments regarding a child's visual behaviors? In order to answer this question, two separate questionnaires were developed. The first questionnaire was addressed to those education students in the final two years of their education curriculum, while the second was addressed to the professors of education involved in those final two years.

The primary focus of the students' questionnaires was to discover how future classroom teachers are educated about vision, as it relates to the learning process in Kansas schools and colleges of education. Specific areas of interest included identifying the depth of coverage education students received regarding various vision problems, whether they had guest speakers with expertise in the area of vision and learning, and whether vision as it applies to learning in the classroom was discussed. Other questions were concerned with what area(s) of education these future teachers intend to become involved and whether these emphasis area(s) influenced the

amount of information they were given regarding vision in the classroom setting.

The educator's questionnaire was nearly identical to the student's questionnaire so that discrepancies, or differences in opinions between the two response groups could be more easily identified based on a question to question approach. The one question asked of the educators not asked of the students was what were the textbook(s) used in their courses, and to what extent was vision covered in that book.

METHODS

Nine Kansas colleges and universities were approached and invited to participate in this study. Of the nine originally contacted, six responded positively and three declined. The three institutions declining participation cited reasons varying from lack of manpower to time constraints. In order to be considered for inclusion, the institutions had to either possess a School of Education or an Education Department. A list and description of colleges and universities that were ultimately chosen appears in Appendix I.

Prior to sending the surveys, phone contact with the head of each School or Department of Education was established. During the course of the conversation, the principal investigator was identified, and the purpose of surveying these schools was explained. After a brief background, a cursory overview of the proposed survey, including the types of questions asked, approximate time commitment and the purpose of this study was provided. The target population was described to the school or department head as: Those instructors involved in any upper division courses that fall in the final two years of the curriculum, and those students who were in their final two years of the institution's education program.

Upon full description of the survey, its intent and the target populations, the school or department heads were asked about any special policies or procedures at the institution that needed to be met before the surveys could be presented to the appropriate persons. Distribution and collection of the surveys was left to the discretion of the School or Department head at each institution in order to ease the educator's task.

Once questions were answered, the educator was thanked for their time, and told that they could expect a packet with the surveys (Appendices II

and III) and attached cover letters (Appendices IV and V) appropriate to each population, as well as a cover letter addressed specifically to them. The packet was to reach each institution by no later than 15 September 1996 and was to be returned, en masse, in the envelopes provided, by no later than 15 October 1996. Any students or educators wishing to receive more information on vision and how it impacts the learning and reading process were sent a follow-up letter and a sheet of adaptations students with vision problems will make, and how teachers can accommodate these children (Appendices VI and VII).

960 student and 125 educator questionnaires were sent to the six colleges and universities choosing to participate in the study. The student surveys were comprised of various questions regarding the respondents' area(s) of emphasis, their knowledge of various vision terms, symptoms and behaviors indicative of learning related vision problems, vision and PL 94-142, their interest in receiving additional information on vision and learning, and whether they would like to have a vision specialist as a guest speaker. The same questions were asked of the educators with one exception, the professors were also asked to name text book(s) used. Data from both groups were analyzed and are displayed as total numbers and percentages in the results section.

RESULTS (Students)

Question 1: Please indicate which area(s) of education in which you intend to become involved.

The largest response to this question was Elementary Education (68.58%), followed by Secondary Education (11.82%), a combination of Elementary Education, EE, and Special Education, SE (8.45%), then EE/Secondary Education, Sec (2.36%), EE/other (1.69%), Sec/other, other, SE, EE/Reading Specialist, RS, and EE/SE/other (all with 1.01% of total response), with Sec/SE and EE/Sec/other following closely behind (0.68%) and EE/Sec/SE/other and no response (each at 0.34%) representing the smallest percentage of respondents. All data, including total number of respondents in each category and the corresponding percentages as well as a school by school breakdown, can be found in Table 1 and in Figures 1A through 1F.

Question 2: In your college education classes, were you familiarized with symptoms and behaviors which could indicate that a student had learning difficulties related to vision?

236 (79.70%) students responded affirmatively to this question, 58 (19.60%) replied negatively, and 2 (0.68%) did not respond at all. Complete results can be found in Table 2 and in Figures 2A through 2F.

Question 3: With regards to severe visual impairment, how in depth was your exposure to this disability in comparison to PL 94-142?

26 (8.80%) students reported that they received extensive coverage of severe visual impairment, while 218 (73.60%) replied that they had moderate coverage of the topic, 48 (16.20%) denied having any explanation of the area of severe visual impairment at all, and 4 (1.40%) did not respond. Complete results can be found in Table 3 and in Figures 3A through 3F.

| | EE | SE | SEC | RS | OTHER | SE, OTHER | EE, OTHER | SEC, OTHER | EE, SE | SEC, SE | EE, SEC | EE, RS | SEC, RS | EE, SEC, SE | EE, SE, OTHER | EE, SEC, OTHER | EE, SEC, SE, OTHER | NO RESPONSE |
|-----------------------------------|------------|----------|-----------|----------|----------|-----------|-----------|------------|-----------|----------|----------|----------|----------|-------------|---------------|----------------|--------------------|-------------|
| FRIENDS UNIVERSITY (19) | 12 | - | 4 | - | 2 | - | - | - | - | - | - | - | - | - | 1 | - | - | - |
| MID AMERICA NAZARENE COLLEGE (34) | 20 | - | 7 | - | - | - | - | - | 3 | 1 | 2 | - | - | - | - | 1 | - | - |
| KANSAS NEWMAN COLLEGE (42) | 20 | 1 | 7 | - | - | - | 2 | 2 | 5 | - | 3 | - | - | - | - | 1 | - | - |
| WASHBURN UNIVERSITY (42) | 22 | - | 13 | - | 1 | - | 1 | - | 1 | - | 2 | 1 | - | - | 1 | - | - | - |
| KANSAS STATE UNIVERSITY (159) | 129 | 2 | 4 | - | - | - | 2 | 1 | 16 | 1 | - | 2 | - | - | 1 | - | 1 | - |
| TOTALS | 203 | 3 | 35 | - | 3 | - | 5 | 3 | 25 | 2 | 7 | 3 | - | - | 3 | 2 | 1 | 1 |
| PERCENTAGE OF RESPONSES | 68.58% | 1.01% | 11.82% | 0.00% | 1.01% | 0.00% | 1.69% | 1.01% | 8.45% | 0.68% | 2.36% | 1.01% | 0.00% | 0.00% | 1.01% | 0.68% | 0.34% | 0.34% |

TABLE 1: School by school, as well as total analysis of future educator's major discipline of study.

KEY to ABBREVIATIONS:

EE: Elementary Education

SE: Special Education

SEC: Secondary Education

RS: Reading Specialist

QUESTION ONE: Indicate which area(s) of education in which you intend to be involved.

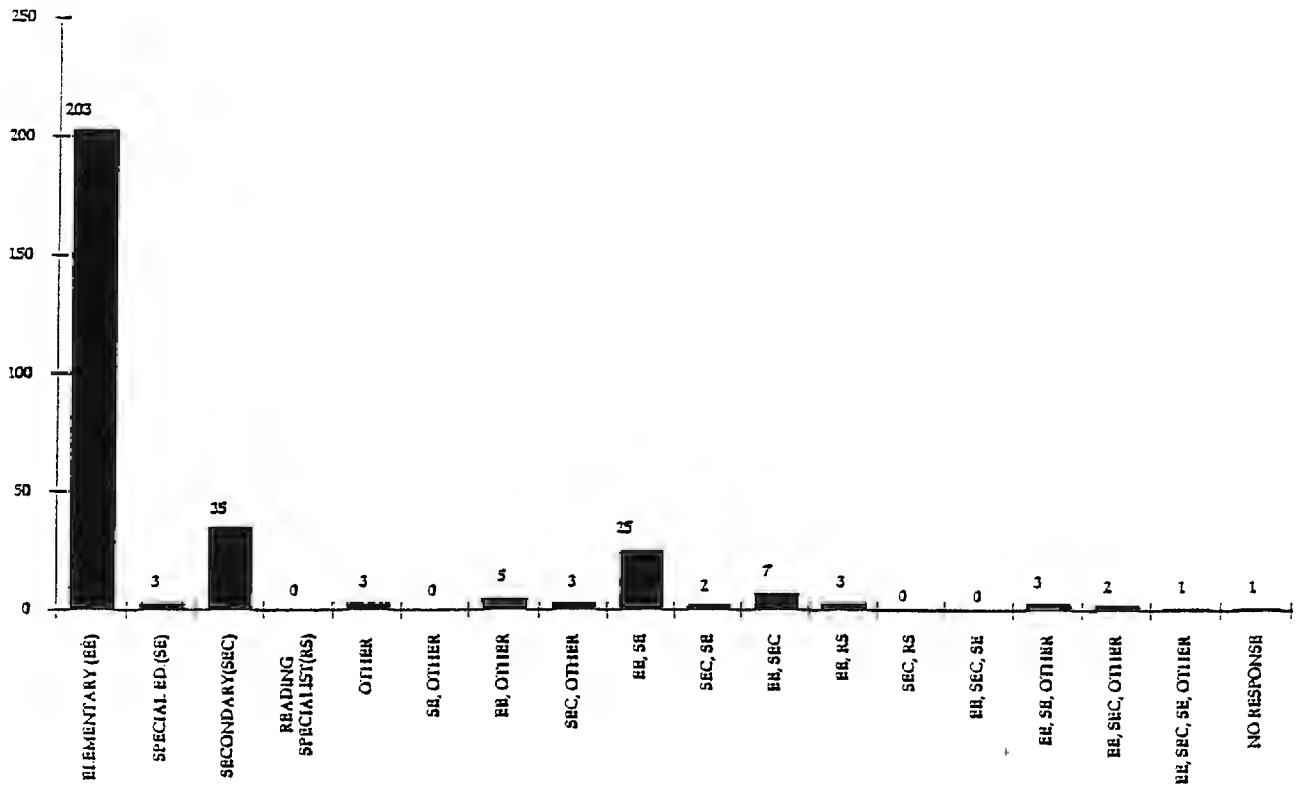


FIGURE 1A: Areas of education which students intend to become involved- All institutions.

FRIENDS UNIVERSITY

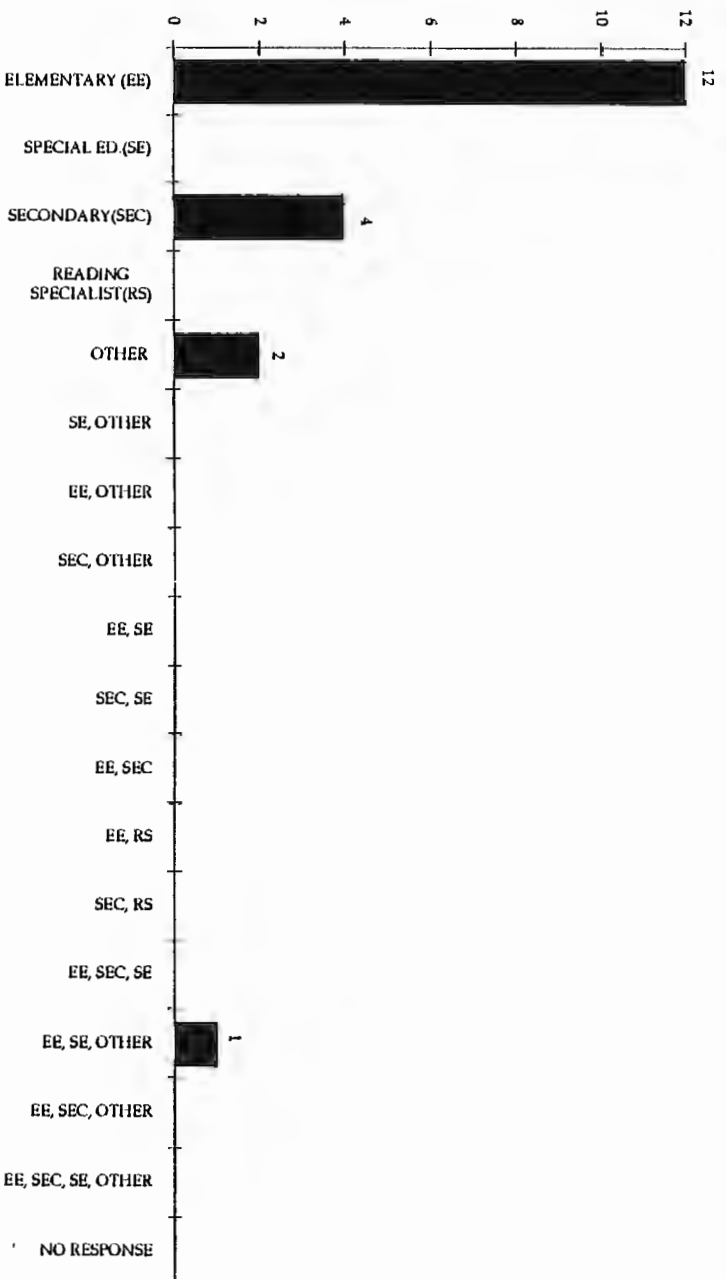


FIGURE 18: Areas of education which students intend to become involved- Friends University.

MID AMERICA NAZARENE COLLEGE

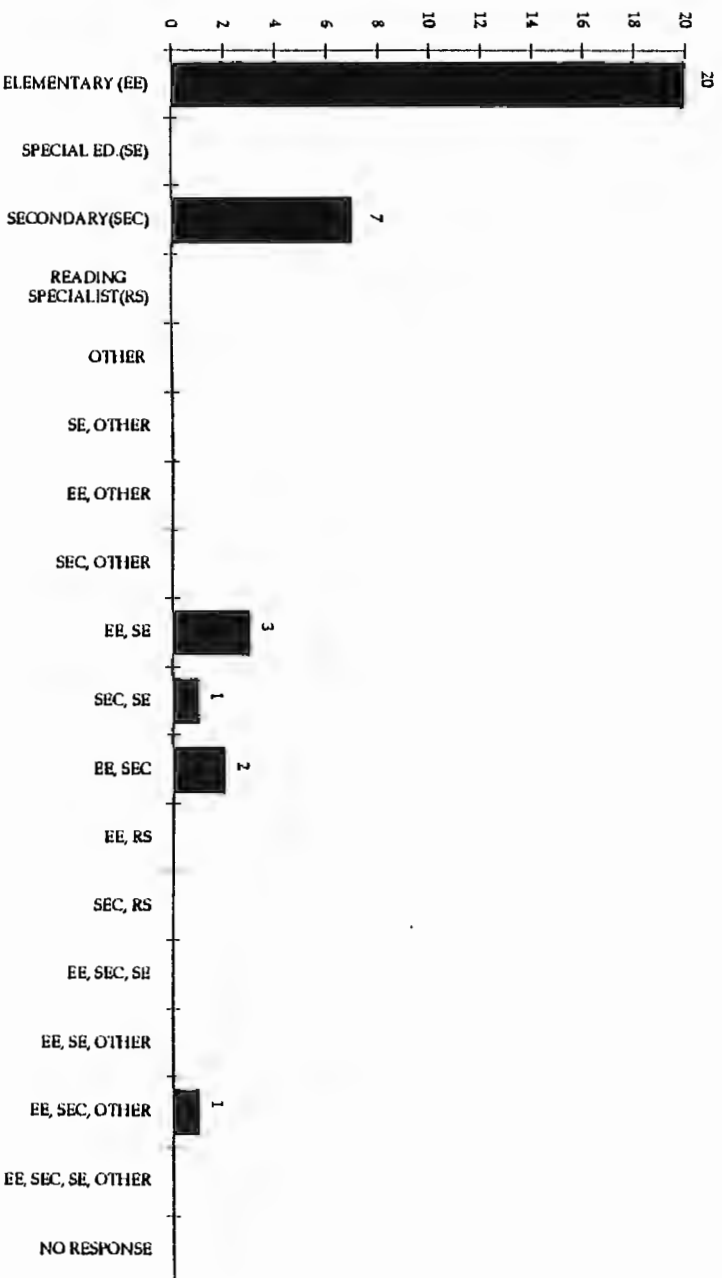


FIGURE 1C: Areas of education which students intend to become involved- Mid America Nazarene College

KANSAS NEWMAN COLLEGE

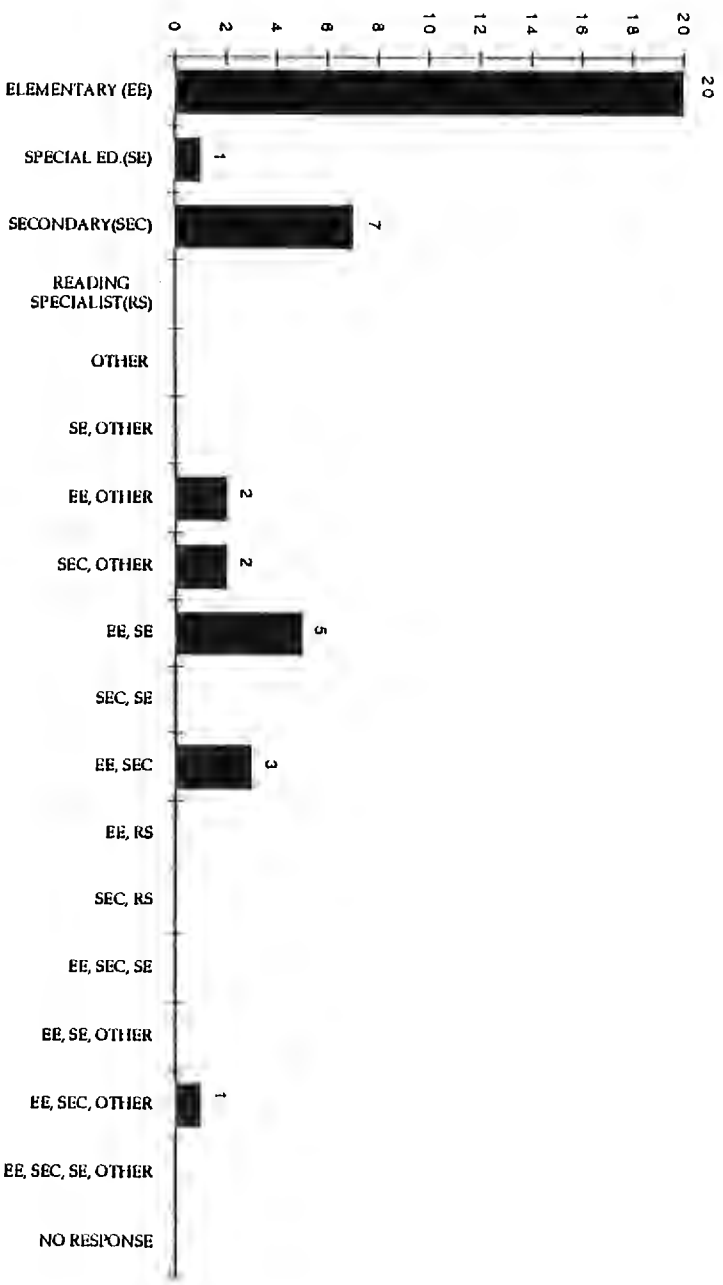


FIGURE 1D: Areas of education which students intend to become involved- Kansas Newman College.

WASHBURN UNIVERSITY

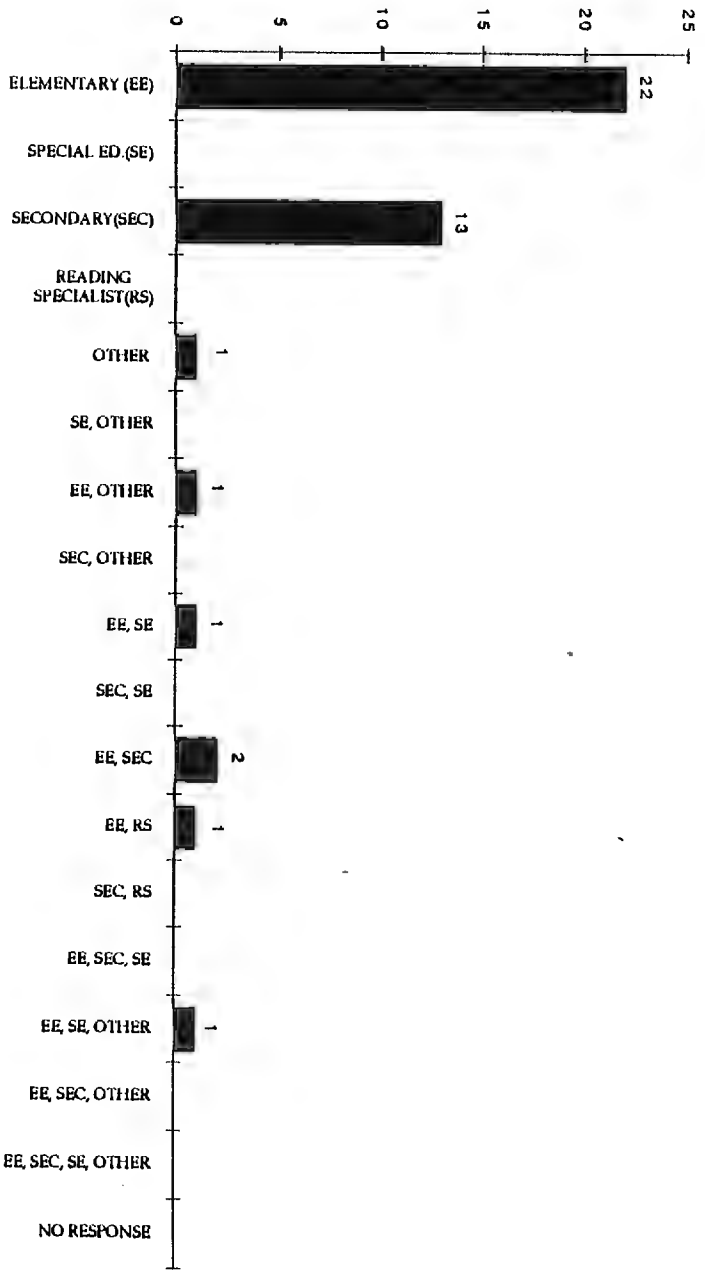


FIGURE 1E: Areas of education which students intend to become involved- Washburn University.

KANSAS STATE UNIVERSITY

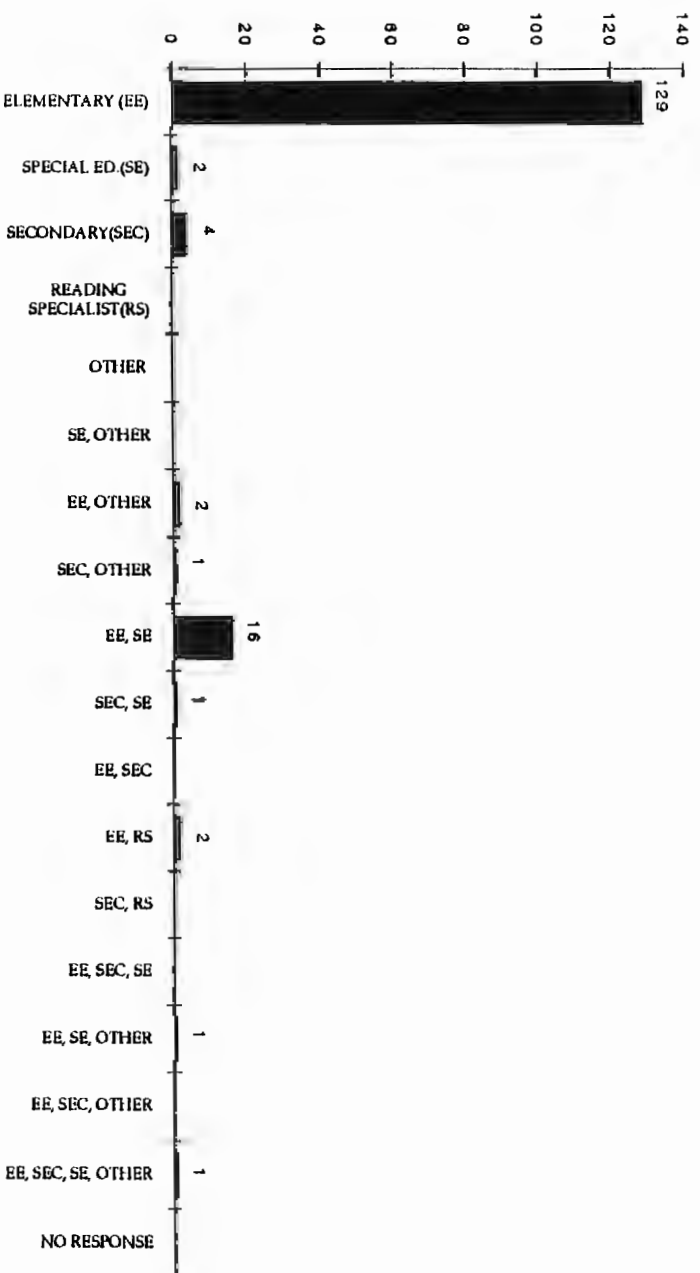


FIGURE 1F: Areas of education which students intend to become involved- Kansas State University.

| | YES | NO | NO RESPONSE |
|-----------------------------------|--------------|-------------|-------------|
| FRIENDS UNIVERSITY (19) | 19 (100.00%) | 0 (0.00%) | 0 (0.00%) |
| MID AMERICA NAZARENE COLLEGE (34) | 30 (88.24%) | 3 (8.82%) | 1 (2.94%) |
| KANSAS NEWMAN COLLEGE (42) | 33 (78.57%) | 8 (19.04%) | 1 (2.38%) |
| WASHBURN UNIVERSITY (42) | 34 (80.95%) | 8 (19.05%) | 0 (0.00%) |
| KANSAS STATE UNIVERSITY (159) | 120 (75.47%) | 39 (24.53%) | 0 (0.00%) |
| TOTALS | 236 | 58 | 2 |
| PERCENTAGE OF RESPONSES | 79.73% | 19.59% | 0.68% |

TABLE 2: Responses to determine whether or not students were familiarized with symptoms and behaviors that could indicate learning difficulties related to vision.

QUESTION TWO:

In your college education classes, were you familiarized with symptoms and behaviors which could indicate that a student had learning difficulties related to vision?

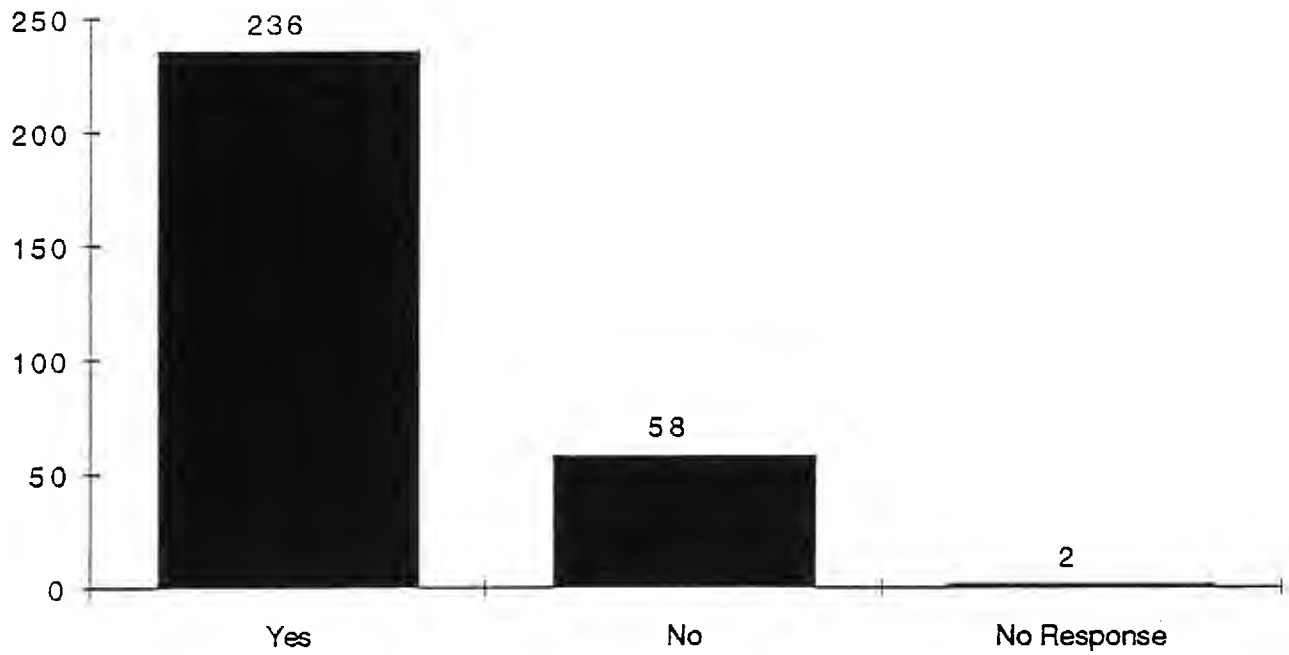


FIGURE 2A: Familiarization with symptoms and behaviors of learning related vision difficulties- All Institutions.

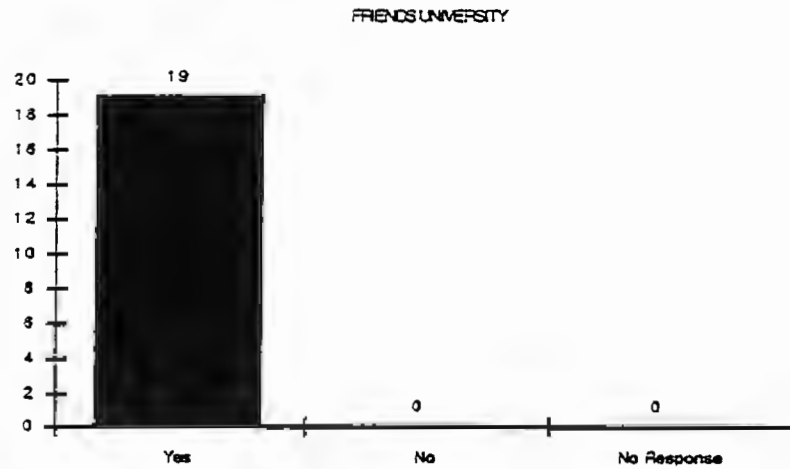


FIGURE 2B: Familiarization with symptoms and behaviors of learning related vision difficulties- Friends University

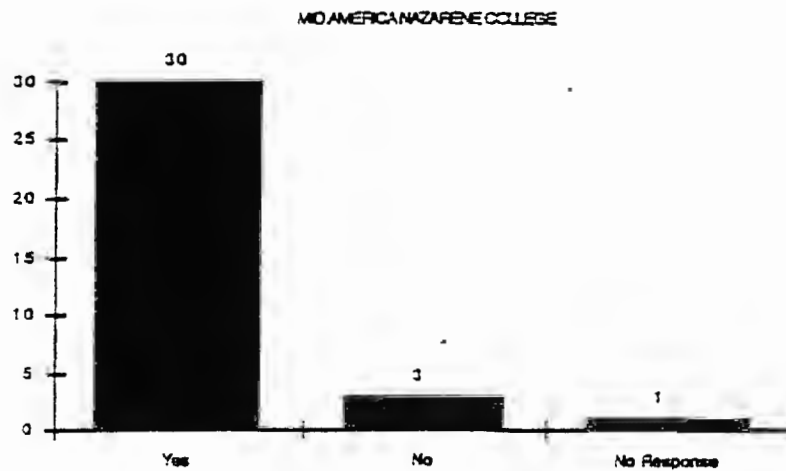


FIGURE 2C: Familiarization with symptoms and behaviors of learning related vision difficulties- Mid America Nazarene College

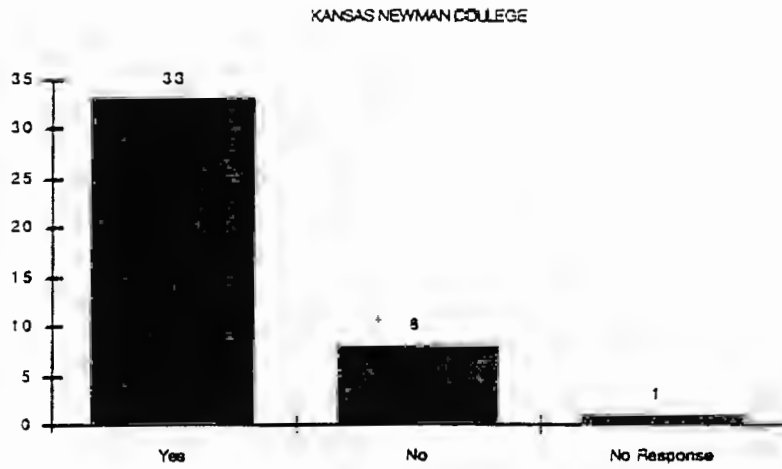


FIGURE 2D: Familiarization with symptoms and behaviors of learning related vision difficulties- Kansas Newman College.

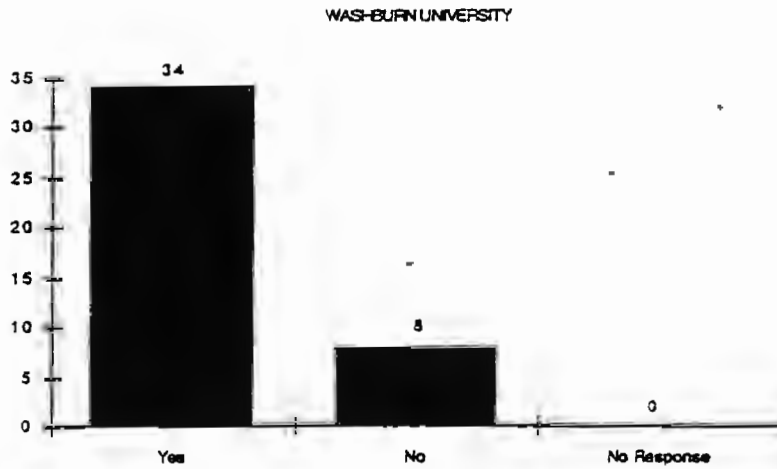


FIGURE 2E: Familiarization with symptoms and behaviors of learning related vision difficulties- Washburn University.

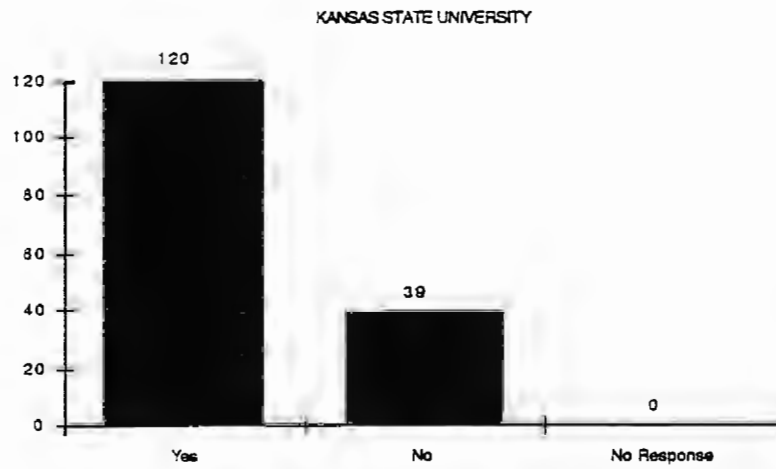


FIGURE 2F: Familiarization with symptoms and behaviors of learning related vision difficulties- Kansas State University

| | EXTENSIVE | MODERATE | NOT AT ALL | NO RESPONSE |
|-----------------------------------|------------|--------------|-------------|-------------|
| FRIENDS UNIVERSITY (19) | 2 (10.53%) | 13 (68.42%) | 3 (15.79%) | 1 (5.26%) |
| MID AMERICA NAZARENE COLLEGE (34) | 2 (5.88%) | 29 (85.29%) | 3 (8.82%) | 0 (0.00%) |
| KANSAS NEWMAN COLLEGE (42) | 4 (9.52%) | 28 (66.67%) | 7 (16.67%) | 2 (4.76%) |
| WASHBURN UNIVERSITY (42) | 5 (11.90%) | 25 (59.52%) | 12 (28.57%) | 0 (0.00%) |
| KANSAS STATE UNIVERSITY (159) | 13 (8.18%) | 123 (77.36%) | 23 (14.47%) | 0 (0.00) |
| TOTALS | 26 | 218 | 48 | 4 |
| PERCENTAGE OF RESPONSES | 8.78% | 73.65% | 16.22% | 1.35% |

TABLE 3: Depth of coverage of severe visual impairment in comparison to PL 94-142.

QUESTION THREE: With regards to severe visual impairment, how in depth was your exposure to this disability in comparison to PL 94-142?

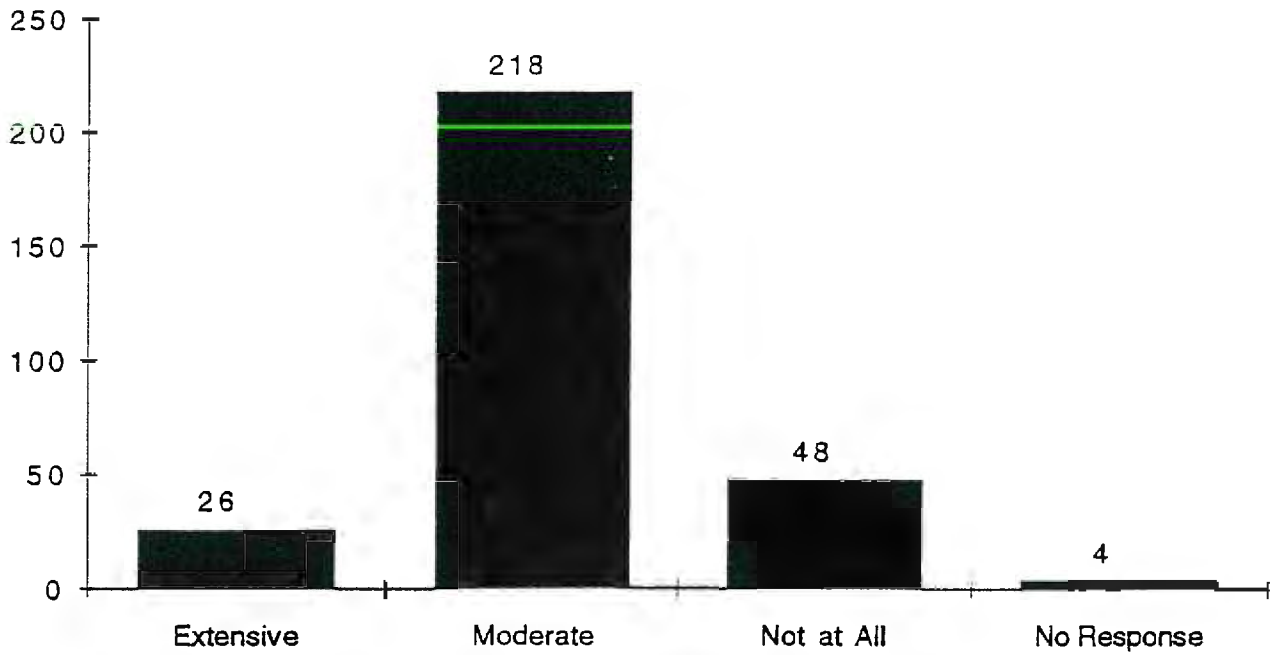


FIGURE 3A: Depth of coverage of severe visual impairment compared to PL 94-142- All Institutions.

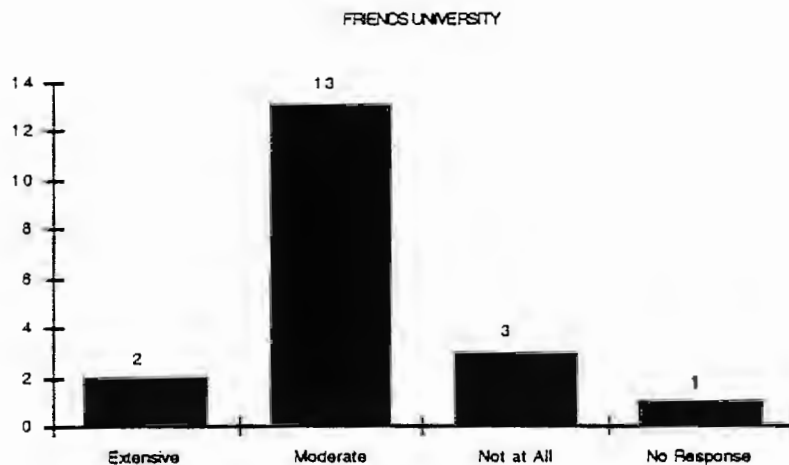


FIGURE 3B: Depth of coverage of severe visual impairment compared to PL 94-142- Friends University.

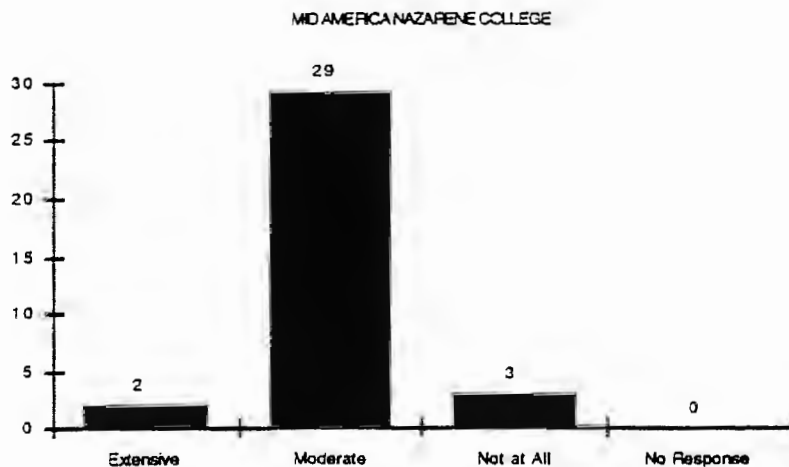


FIGURE 3C: Depth of coverage of severe visual impairment compared to PL 94-142- Mid America Nazarene College

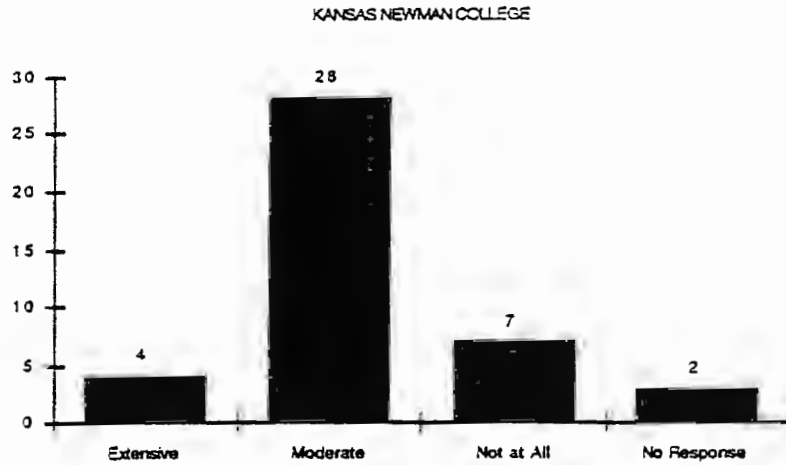


FIGURE 3D: Depth of coverage of severe visual impairment compared to PL 94-142- Kansas Newman College.

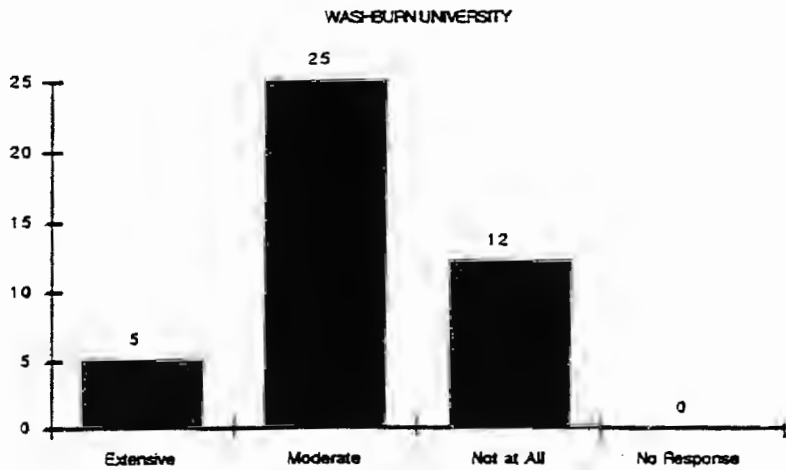


FIGURE 3E: Depth of coverage of severe visual impairment compared to PL 94-142- Washburn University.

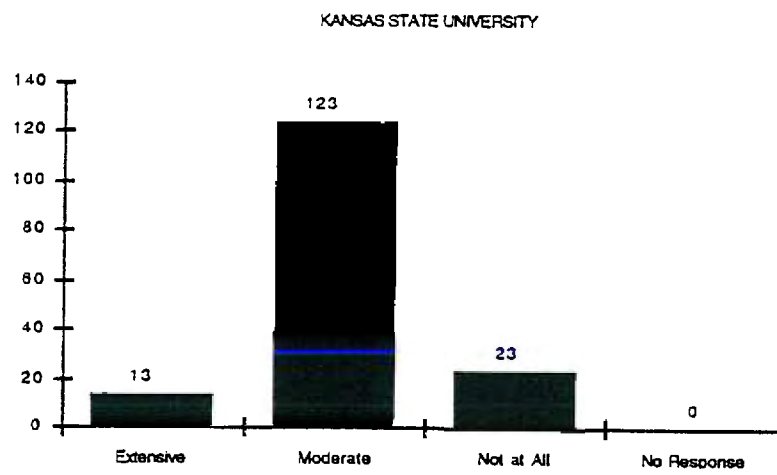


FIGURE 3F: Depth of coverage of severe visual impairment compared to PL 94-142- Kansas State University.

Question 4: Was vision, as it applies to vision in the classroom, addressed in your class(es)?

37 (12.50%) of students replied that vision as it applies to learning in the classroom setting was covered comprehensively in their education class(es). The majority of students, 223 (75.30%), reported that this topic was covered 'somewhat' in their education curriculum. 31 (10.50%) of students said that vision as relates to learning in the classroom was not covered at all, while 5 (1.70%) did not respond to this question. For a complete display of results, see Table 4 and Figures 4A through 4F.

Question 5: Please mark each area of vision that was discussed in your classes then rate your comfort level, or familiarity with each term on the corresponding scale.

For this question, it was necessary to delineate between "good," "moderate" and "poor" understandings of certain vision terms. In order to do this, it was decided that ones and twos would be considered indicative of those possessing a "good," threes a "moderate" and fours and fives a "poor" understanding of the vision terms in question. By eliminating the non-respondents from the calculations, we obtained the following, truer results. About 25% of the students had a poor understanding of myopia and hyperopia, while only about 20% didn't know what eye-hand coordination involved. In addition, just over 30% did not comprehend eye-teaming, visual perception, visual memory or color vision. Most disturbing, though, nearly 40% of those students responding to this question lacked an understanding of what astigmatism or accommodation was, and over 55% didn't understand binocular vision- arguably one of the most important factors in comfortable reading. It's important to remember that these results are exclusive of those not responding to the question, which could also mean

| | COMPREHENSIVELY | SOMEWHAT | NOT AT ALL | NO RESPONSE |
|-----------------------------------|-----------------|--------------|-------------|-------------|
| FRIENDS UNIVERSITY (19) | 4 (21.05%) | 15 (78.95%) | 0 (0.00%) | 0 (0.00%) |
| MID AMERICA NAZARENE COLLEGE (34) | 5 (14.71%) | 29 (85.29%) | 0 (0.00%) | 0 (0.00%) |
| KANSAS NEWMAN COLLEGE (42) | 7 (16.67%) | 27 (64.29%) | 4 (9.52%) | 4 (9.52%) |
| WASHBURN UNIVERSITY (42) | 5 (11.90%) | 31 (73.81%) | 6 (14.29%) | 0 (0.00%) |
| KANSAS STATE UNIVERSITY (159) | 16 (10.06%) | 121 (76.10%) | 21 (13.21%) | 1 (0.63%) |
| TOTALS | 37 | 223 | 31 | 5 |
| PERCENTAGE OF RESPONSES | 12.50% | 75.34% | 10.47% | 1.69% |

TABLE 4: Responses as to whether or not vision as it applies to learning in the classroom was addressed in the student's class(es).

QUESTION FOUR: Was vision, as it applies to learning in the classroom, addressed in your class.

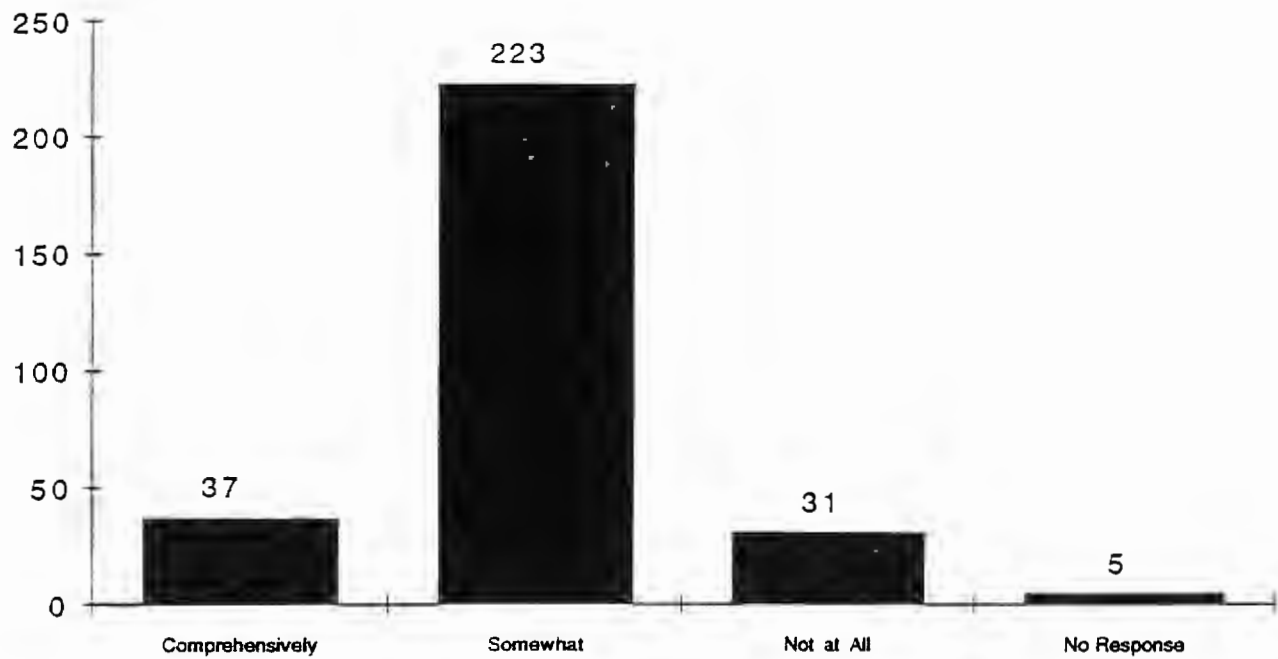


FIGURE 4A: Discussion of vision and learning in the classroom- All institutions.

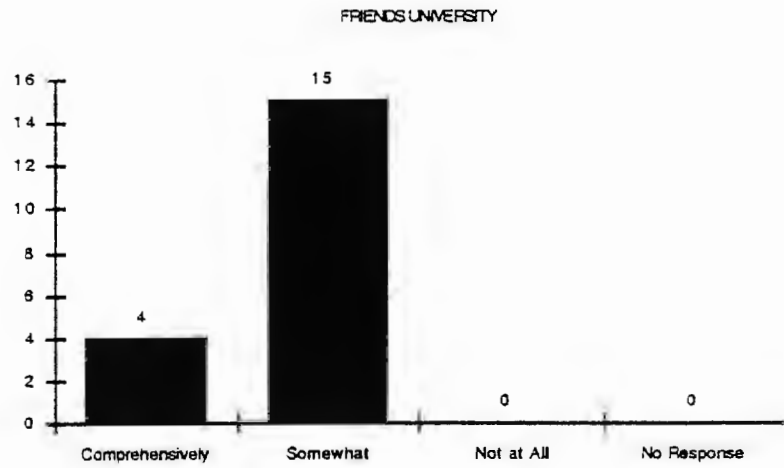


FIGURE 4B: Discussion of vision and learning in the classroom- Friends University.

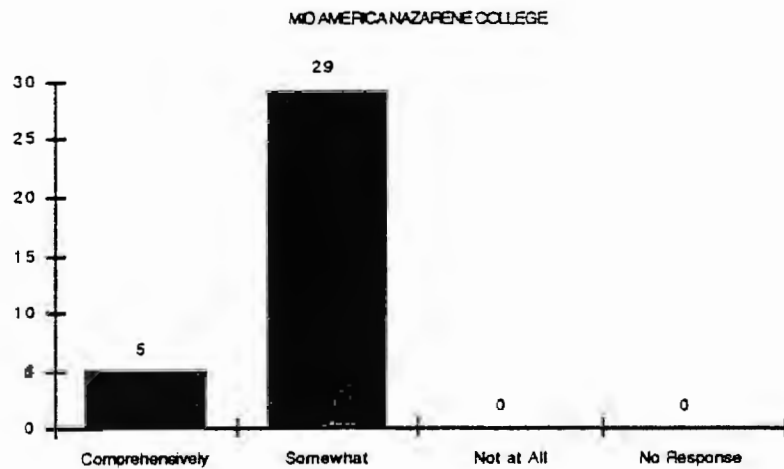


FIGURE 4C: Discussion of vision and learning in the classroom- Mid America Nazarene College.

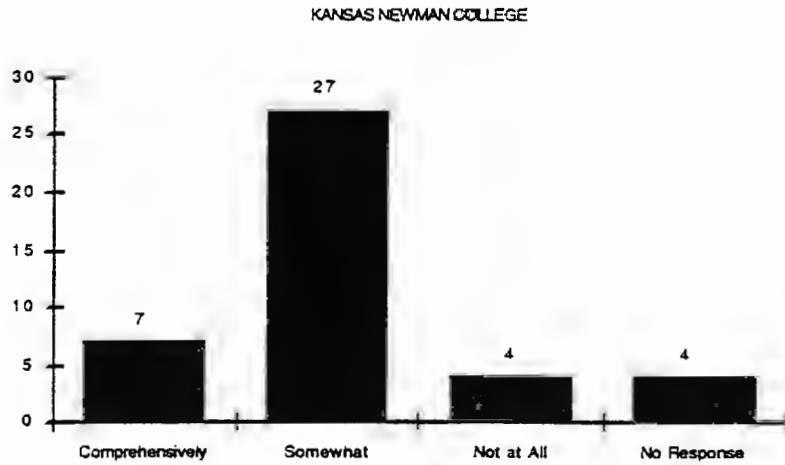


FIGURE 4D: Discussion of vision and learning in the classroom- Kansas Newman College.

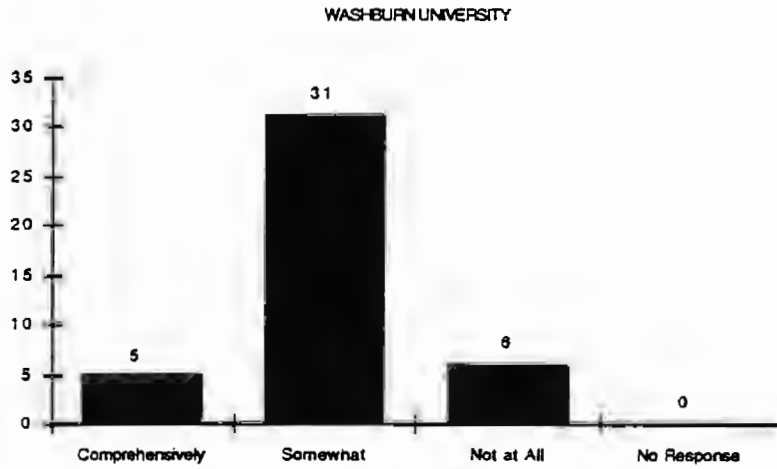


FIGURE 4E: Discussion of vision and learning in the classroom- Washburn University.

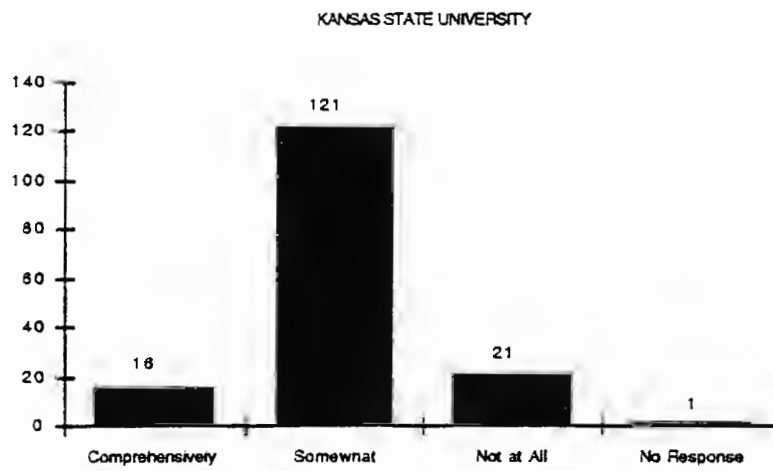


FIGURE 4F: Discussion of vision and learning in the classroom- Kansas State University.

| | | MYOPIA | HYPEROPIA | ASTIGMATISM | EYE-HAND COORDINATION | TRACKING | ACCOMMODATION | BINOCULAR VISION | COLOR VISION | VISUAL MEMORY | VISUAL PERCEPTION |
|-----------------------------------|--------------------------|--------|-----------|-------------|-----------------------|----------|---------------|------------------|--------------|---------------|-------------------|
| FRIENDS UNIVERSITY (19) | MEAN | 2.167 | 2.167 | 2.764 | 2.368 | 2.667 | 2.688 | 2.882 | 2.647 | 3.071 | 2.706 |
| | S.D. | 1.098 | 1.098 | 1.348 | 0.955 | 1.138 | 1.25 | 1.219 | 1.219 | 1.269 | 1.047 |
| MID AMERICA NAZARENE COLLEGE (34) | MEAN | 2.531 | 2.562 | 3.233 | 2.469 | 2.613 | 3.032 | 3.69 | 3.267 | 3.129 | 3.208 |
| | S.D. | 1.391 | 1.366 | 1.305 | 1.191 | 1.23 | 1.303 | 1.039 | 1.112 | 1.056 | 0.883 |
| KANSAS NEWMAN COLLEGE (42) | MEAN | 2.143 | 2 | 2.385 | 1.9 | 2.312 | 2.538 | 2.692 | 2.393 | 2.667 | 2.214 |
| | S.D. | 1.208 | 1.109 | 1.299 | 0.923 | 1.061 | 0.989 | 1.087 | 1.066 | 1.112 | 0.995 |
| WASHBURN UNIVERSITY (42) | MEAN | 2.378 | 2.405 | 2.886 | 2.5 | 2.688 | 3.065 | 3.679 | 2.871 | 2.867 | 2.781 |
| | S.D. | 1.21 | 1.166 | 1.367 | 1.108 | 1.23 | 1.181 | 0.9833 | 1.258 | 0.973 | 1.039 |
| KANSAS STATE UNIVERSITY (159) | MEAN | 2.976 | 3.045 | 3.472 | 2.838 | 3.3 | 3.496 | 3.903 | 3.224 | 3.248 | 3.35 |
| | S.D. | 1.218 | 1.184 | 1.219 | 1.205 | 1.142 | 1.15 | 0.965 | 1.163 | 1.112 | 1.152 |
| | TOTAL MEAN | 2.663 | 2.694 | 3.157 | 2.595 | 2.934 | 3.194 | 3.601 | 3.039 | 3.043 | 3.051 |
| | TOTAL STANDARD DEVIATION | 1.268 | 1.247 | 1.32 | 1.176 | 1.211 | 1.209 | 1.101 | 1.195 | 1.136 | 1.145 |

TABLE 5: Mean and Standard Deviation display of students' 'Familiarity with areas of vision'.

QUESTION FIVE:

Please mark each area of vision that was discussed in your classes and then rate your comfort or familiarity with each term on the corresponding scale.

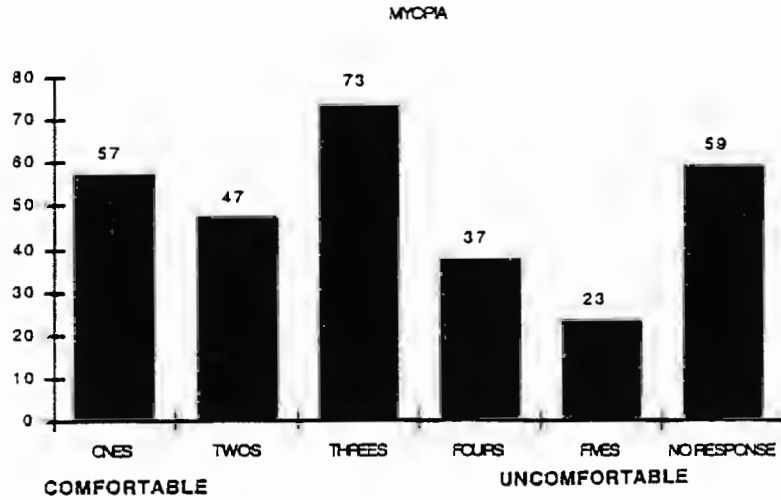


FIGURE 5A: Comfort level with Myopia.

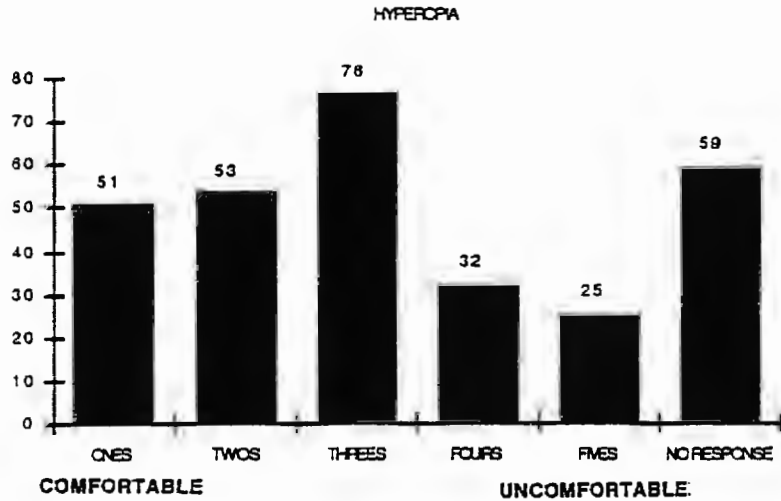


FIGURE 5B: Comfort level with Hyperopia.

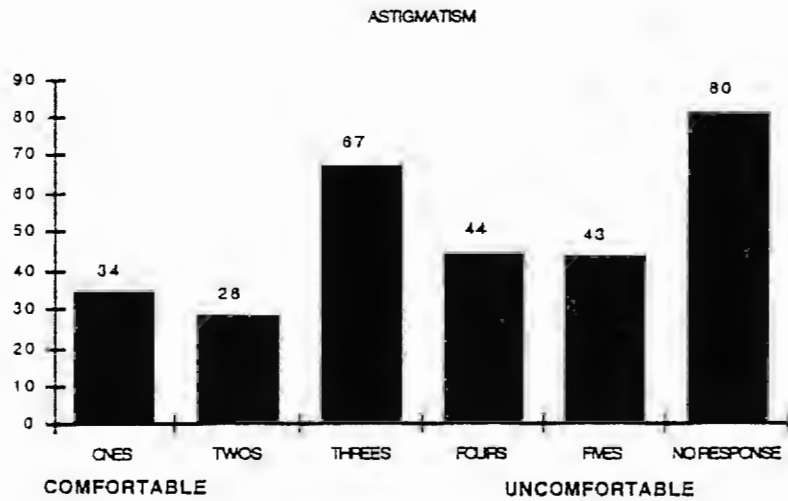


FIGURE 5C: Comfort level with Astigmatism.

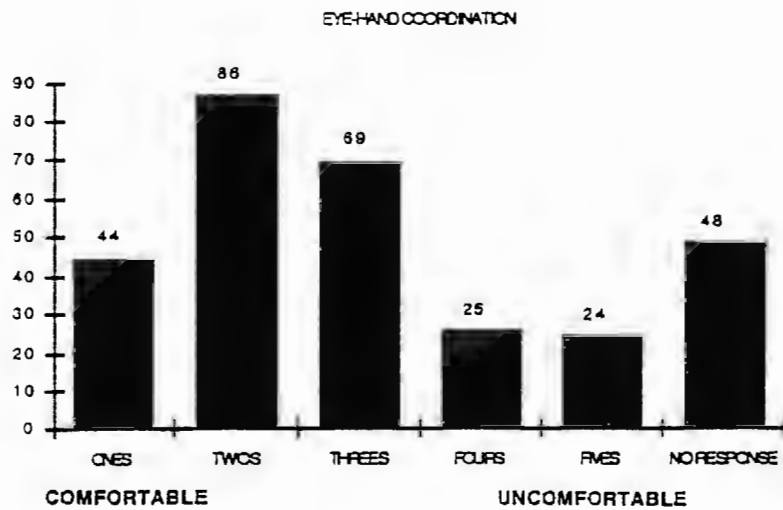


FIGURE 5D: Comfort level with Eye-Hand Coordination.

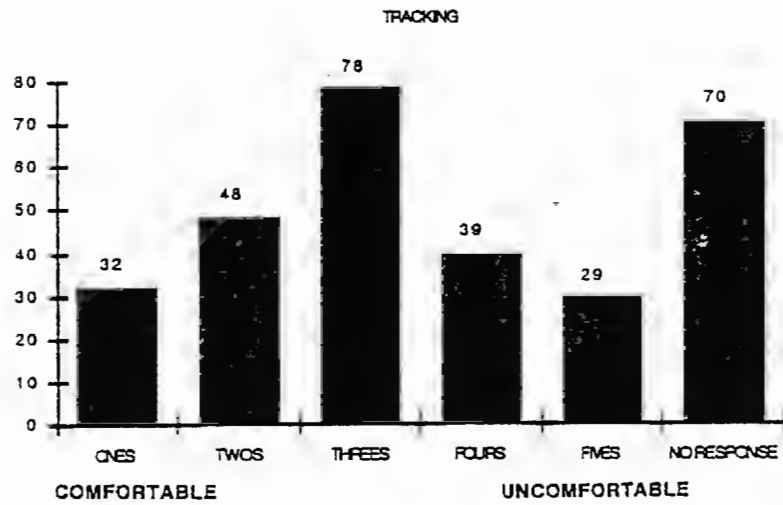


FIGURE 5E: Comfort level with Eye Tracking.

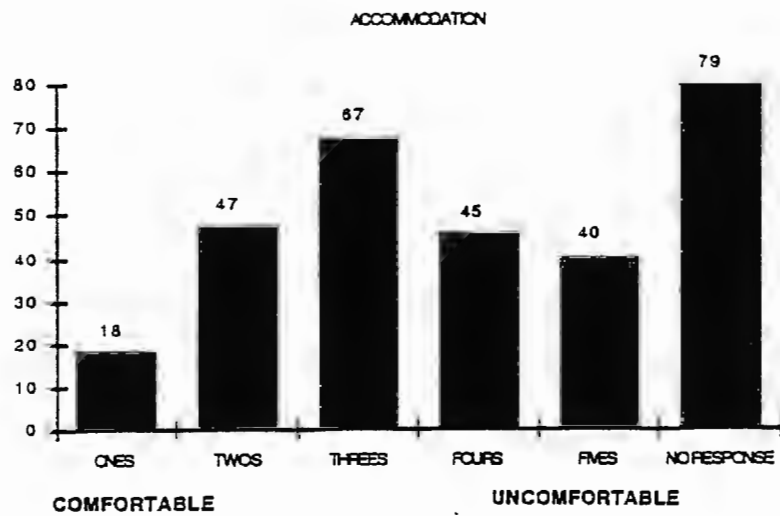


FIGURE 5F: Comfort level with Accommodation.

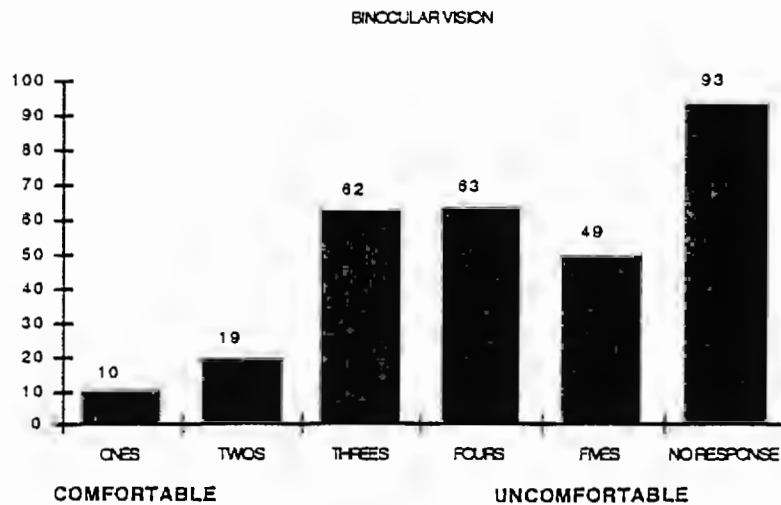


FIGURE 5G: Comfort level with Binocular Vision.

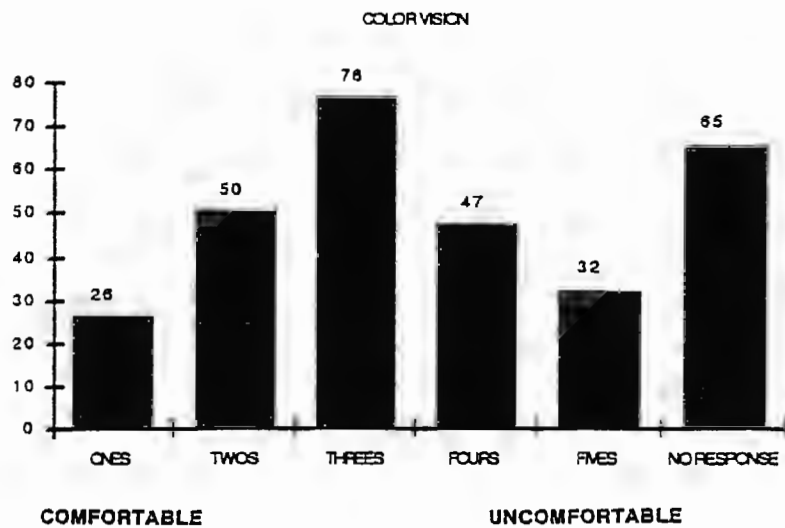


FIGURE 5H: Comfort level with Color Vision.

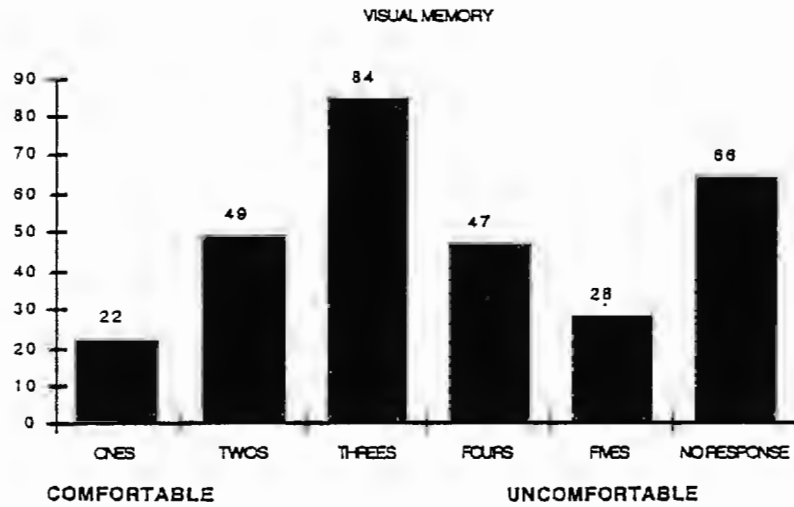


FIGURE 5I: Comfort level with Visual Memory.

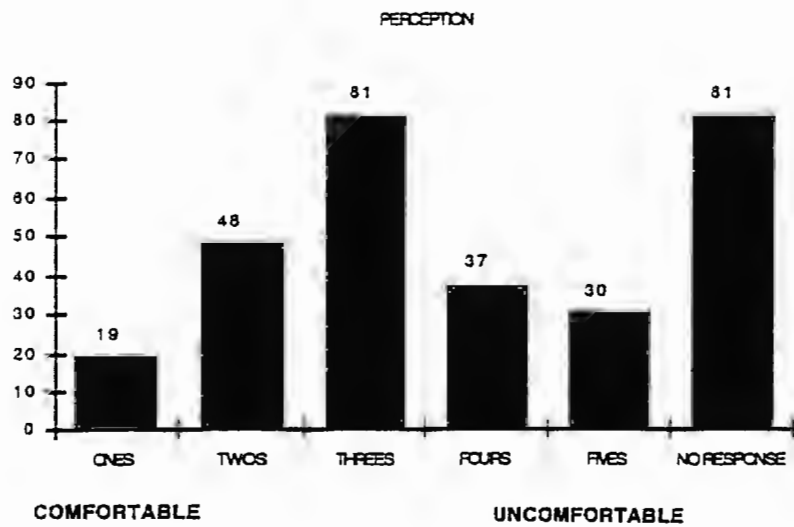


FIGURE 5J: Comfort level with Visual Perception.

even higher percentage of future classroom teachers who were never exposed to any of these vision terms. For complete results, see Table 5 and Figures 5A through 5J.

Question 6- Part I: Did guest lecturers speak in any of your college education courses on the role of vision and learning?

Only 15 (5.07%) of students indicated that they had a guest speaker more than once, while 77 (26.01%) replied that there had been an invited speaker in their college education course(s) once. The majority of students, 202 (68.24%) reported having never had a guest speaker in their college education curriculum. There were only 2 (0.68%) students that did not respond to this question. For a complete display of data, see Table 6A and/or Figures 6A through 6F.

Question 6- Part II: If you had a guest speaker, what was the speaker's profession?

Using only those students who indicated having had a guest speaker to determine who was giving the talk, it was determined that the students weren't actually sure as to the professional orientation of the speaker. In fact, the majority of respondents, 39.00% (39), could not recall the profession of their guest lecturer. The second highest response fell in the 'other' category, which received 37.00% (37) of all responses. Most 'other' responses related to a talk by a blind child and his mother, who spoke to an education class at Kansas State University. The rest of the replies were scattered over several categories, including 11 indicated Reading Specialists (11.00%), 8 Optometrists (8.00%), 2 Ophthalmologists (2.00%), 2 'no responses' (2.00%) and 1 nurse (1.00%). For a complete display of data, refer to Table 7 and/or Figure 7.

| | MORE THAN ONCE | ONCE | NEVER | NO RESPONSE |
|-----------------------------------|----------------|-------------|--------------|-------------|
| FRIENDS UNIVERSITY (19) | 2 (10.53%) | 10 (53.00%) | 7 (36.80%) | 0 (0.00%) |
| MID AMERICA NAZARENE COLLEGE (34) | 1 (2.94%) | 2 (5.90%) | 31 (91.20%) | 0 (0.00%) |
| KANSAS NEWMAN COLLEGE (42) | 4 (9.52%) | 11 (26.00%) | 26 (61.90%) | 1 (2.38%) |
| WASHBURN UNIVERSITY (42) | 2 (4.76%) | 9 (21.00%) | 31 (73.80%) | 0 (0.00%) |
| KANSAS STATE UNIVERSITY (159) | 6 (3.77%) | 45 (28.00%) | 107 (67.30%) | 1 (0.63%) |
| TOTALS | 15 | 77 | 202 | 2 |
| PERCENTAGE OF RESPONSES | 5.07% | 26.00% | 68.20% | 0.68% |

TABLE 6: Number of times students indicated the presence of a guest speaker.

QUESTION SIX PART I:

Did guest lecturers speak in any of your college education courses on vision and learning?

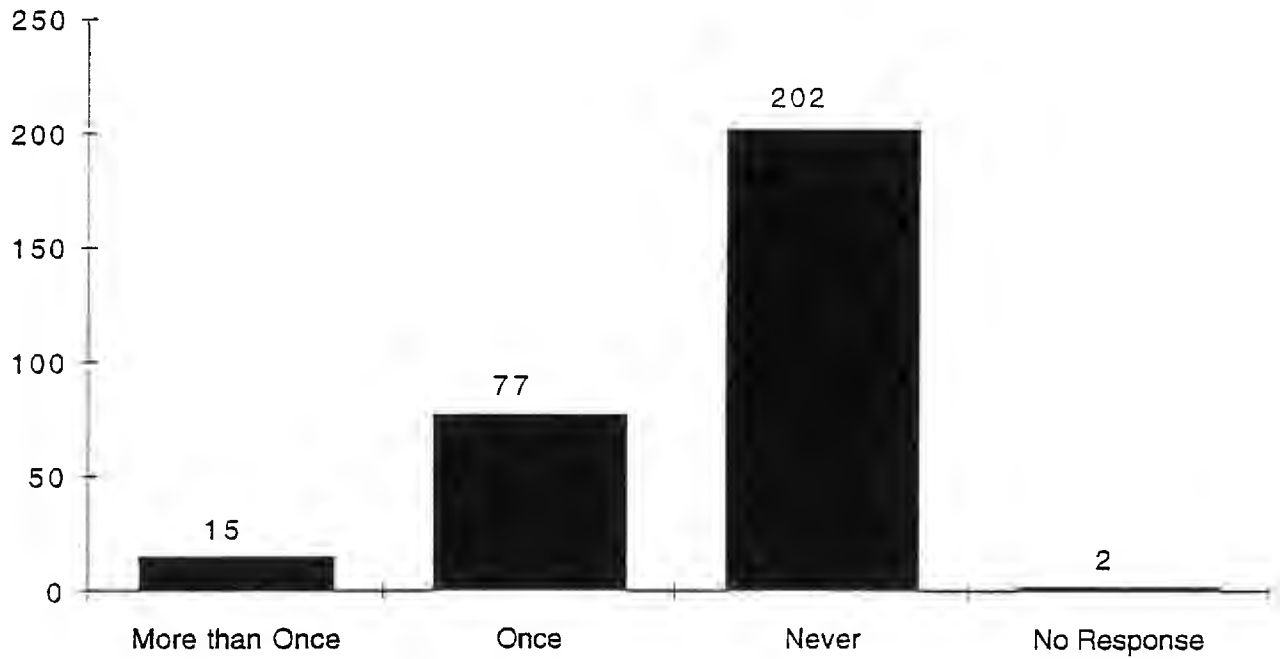


FIGURE 6A: Frequency of guest speakers in college education courses- All institutions.

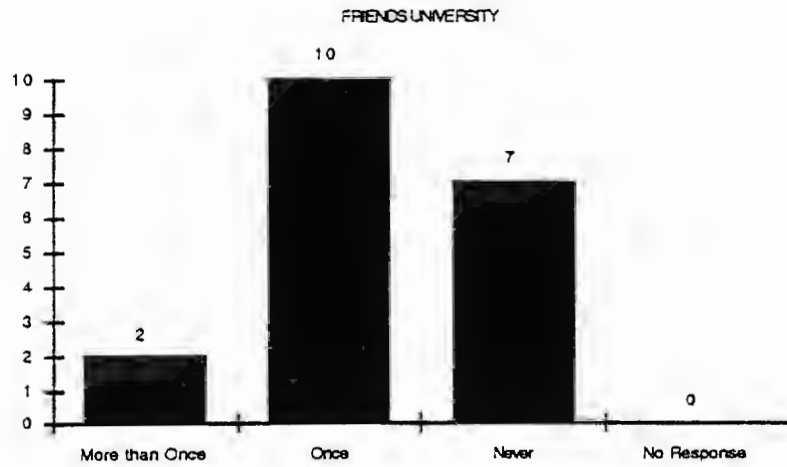


FIGURE 6B: Frequency of guest speakers in college education courses- Friends University.

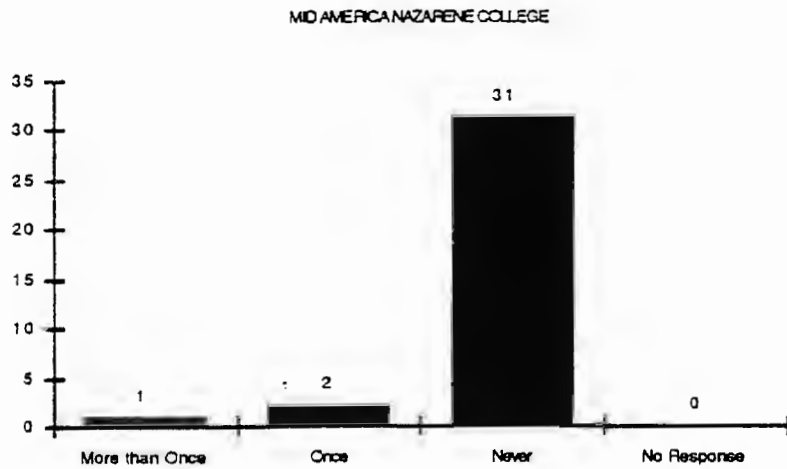


FIGURE 6C: Frequency of guest speakers in college education courses- Mid America Nazarene College.

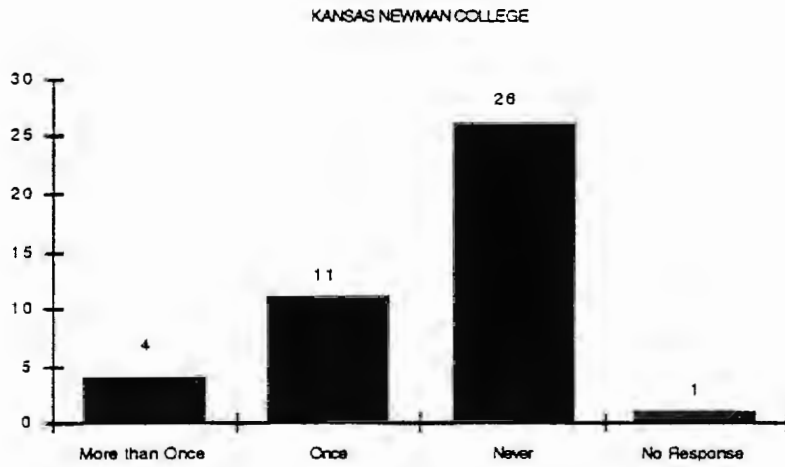


FIGURE 6D: Frequency of guest speakers in college education courses- Kansas Newman College.

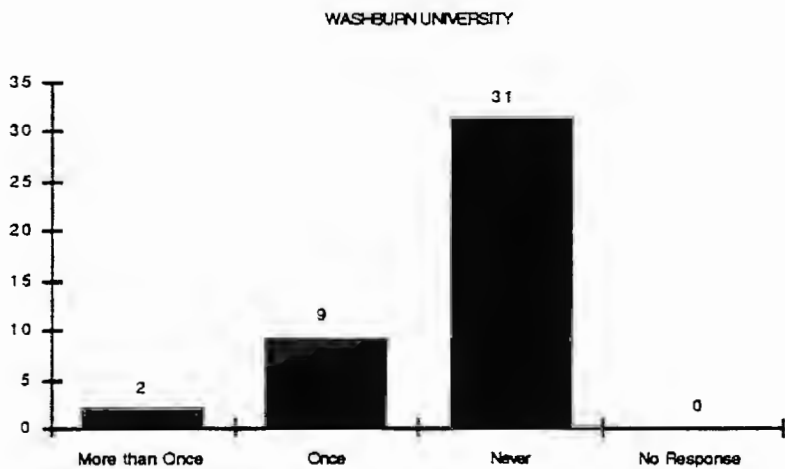


FIGURE 6E: Frequency of guest speakers in college education courses- Washburn University.

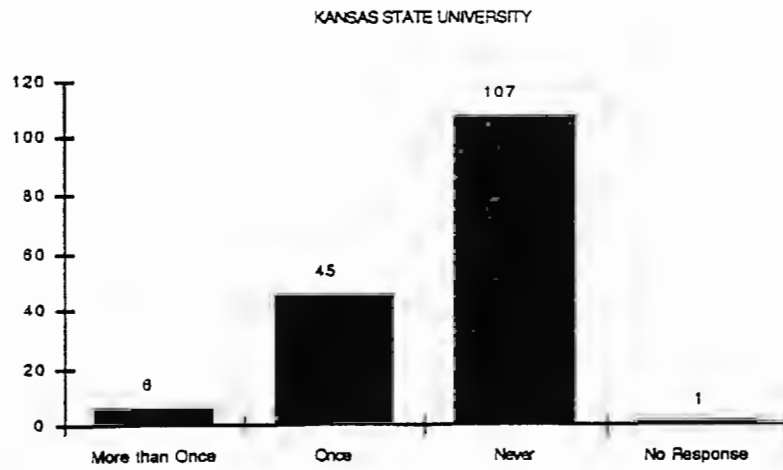


FIGURE 6F: Frequency of guest speakers in college education courses- Kansas State University.

| | NO RESPONSE | NURSE | OPHTHALMOLOGIST | OPTOMETRIST | READING SPECIALIST | PHYSICIAN | OTHER | UNSURE |
|-----------------------------------|-------------|-----------|-----------------|-------------|--------------------|-----------|-------------|-------------|
| FRIENDS UNIVERSITY (19) | 0 (0.00%) | 0 (0.00%) | 2 (10.52%) | 6 (32.00%) | 1 (5.26%) | 0 (0.00%) | 0 (0.00%) | 4 (21.05%) |
| MID AMERICA NAZARENE COLLEGE (34) | 0 (0.00%) | 0 (0.00%) | 0 (0.00%) | 1 (2.94%) | 1 (2.94%) | 0 (0.00%) | 0 (0.00%) | 1 (2.94%) |
| KANSAS NEWMAN COLLEGE (42) | 1 (2.38%) | 0 (0.00%) | 1 (2.38%) | 2 (4.80%) | 0 (0.00%) | 0 (0.00%) | 2 (4.80%) | 12 (28.57%) |
| WASHBURN UNIVERSITY (12) | 0 (0.00%) | 0 (0.00%) | 0 (0.00%) | 0 (0.00%) | 3 (7.14%) | 0 (0.00%) | 4 (9.52%) | 5 (11.90%) |
| KANSAS STATE UNIVERSITY (159) | 1 (0.63%) | 1 (0.63%) | 0 (0.00%) | 0 (0.00%) | 4 (2.52%) | 0 (0.00%) | 33 (20.75%) | 17 (10.69%) |
| TOTALS | 2 | 1 | 2 | 8 | 11 | 0 | 37 | 39 |
| PERCENTAGE OF RESPONSES | 0.68% | 0.34% | 0.68% | 2.70% | 3.72% | 0.00% | 12.50% | 13.18% |

TABLE 7: Profession of guest speaker.

QUESTION SIX- PART II: What was the speaker's profession?

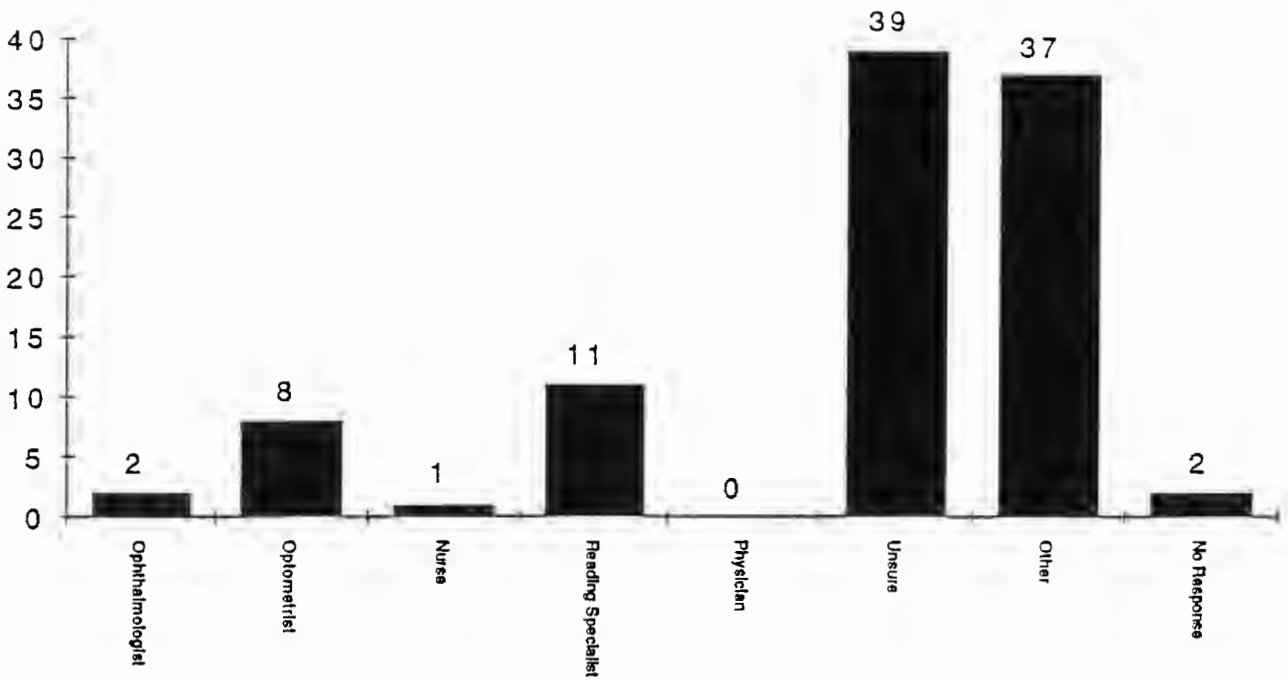


FIGURE 7: Profession of guest speakers- All institutions.

Question 7: Would you be interested in having a vision specialist speak to your education classes about vision and how it relates to learning?

The great majority of students either replied 'very much' (157 and 53.04%), or at least 'maybe' (130 and 43.92%). These two categories accounted for over 96% of all responses. Only 7 (2.36%) students replied negatively with 2 (0.68%) not responding to this question. For a complete display of the data, refer to Table 8 and/or Figures 8A through 8F.

Question 8: Would you be interested in receiving more information on the visual system and how it impacts the learning and reading process?

Again, the great majority of students, 60.81% (180) replied affirmatively, while the minority, 30.74% (91) responded negatively. Only 25 (8.45%) of students did not respond to this question. For a complete display of the data, see Table 9 and/or Figures 9A through 9F.

The next question was whether or not the future educator's area of interest influenced the exposure to possible behaviors and/or symptoms children with vision problems may exhibit. Elementary educators had the largest number of respondents with 203 total. The overwhelming majority, 75.37%, replied affirmatively to having received information regarding possible behaviors and symptoms, while 24.14% replied negatively to this inquiry. The second largest response came from students indicating interest in secondary education. Of the 35 people that responded, 85.71% replied positively while 14.29% replied negatively. The combination of elementary education and special education held the third highest number of respondents with 25, of which 92.00% replied in the positive and 8.00% in the negative. The remaining categories, their numbers and the percentage breakdowns may be found in Table 10.

The next area of interest was whether the student's future discipline influenced the extent to which visual impairment with regards to PL 94-142 was addressed in their class work. Taking a purely cursory overview, it was readily apparent that the great majority of responses fell in the 'moderate coverage' category, with the results resembling a bell curve. In fact, 76.35% of future elementary educators responded that they had received 'moderate coverage', while 7.39% indicated 'extensive coverage' and 15.27% replied that they had gotten no coverage at all. Compare those results to 71.43% of future secondary educators who indicated that they had received 'moderate coverage', with 2.86% revealing that they had been the recipients of 'extensive coverage' and 25.71% denying having had the benefit of any coverage at all. Of the 25 EE/SE respondents, 80.00% indicated 'moderate coverage', while 16.00% indicated 'extensive coverage' and 4.00% denied any exposure to the topic of visual impairment compared to PL 94-142. The complete results for this question can be found in Table 11.

The next item of interest was whether or not the student's future discipline affected whether or not vision as it applies to learning was addressed in their class(es). The results of this analysis were nearly identical to those of the previous question: The large majority of students indicated that vision, as it applies to learning in the classroom, was covered 'somewhat.' 76.85% of future elementary educators replied that vision and learning was covered 'somewhat', while 9.85% responded that they felt the topic was addressed 'comprehensively'. However, 11.82% of future elementary educators reported having had no coverage of the topic at all. Future secondary educators had a distribution that was nearly identical. In fact, 68.57% indicated the topic was addressed 'somewhat', with 20.00% of responses indicating 'comprehensive' coverage and 8.57% of the respondents

denying any coverage of the topic at all. Future EE/SE responses revealed there to be 68.00% 'somewhat', 24.00% 'comprehensive' and 8.00% no coverage at all. For a complete listing of results, please refer to Table 12.

There was also an attempt at finding some sort of relationship between positive or negative response to whether the student was familiarized with behaviors or symptoms of vision problems and to what extent vision as it applies to learning was addressed in their class(es). The results of this comparison revealed that the overwhelming majority (61.86%) of those students who responded that they had been familiarized with behaviors and symptoms indicative of vision problems also reported having received comprehensive coverage of vision and the learning process. 4.50% of those indicated having been informed of the various behaviors and symptoms indicative of a vision problem replied that they only received a moderate amount of instruction on vision and the learning process. For complete results, see Table 13.

| | VERY MUCH | MAYBE | NO | NO RESPONSE |
|-----------------------------------|-------------|-------------|-----------|-------------|
| FRIENDS UNIVERSITY (19) | 12 (63.16%) | 6 (31.58%) | 1 (5.26%) | 0 (0.00%) |
| MID AMERICA NAZARENE COLLEGE (34) | 20 (58.82%) | 12 (35.29%) | 2 (5.88%) | 0 (0.00%) |
| KANSAS NEWMAN COLLEGE (42) | 29 (69.05%) | 12 (28.57%) | 0 (0.00%) | 1 (2.38%) |
| WASHBURN UNIVERSITY (42) | 22 (52.38%) | 20 (47.62%) | 0 (0.00%) | 0 (0.00%) |
| KANSAS STATE UNIVERSITY (159) | 74 (46.54%) | 80 (50.31%) | 4 (2.52%) | 1 (0.63%) |
| TOTALS | 157 | 130 | 7 | 2 |
| PERCENTAGE OF RESPONSES | 53.04% | 43.92% | 2.36% | 0.68% |

TABLE 8: Interest in having a vision specialist speak to college education classes, as indicated by the students.

QUESTION SEVEN:

Would you be interested in having a vision specialist speak to your college-education classes about vision and how it relates to learning?

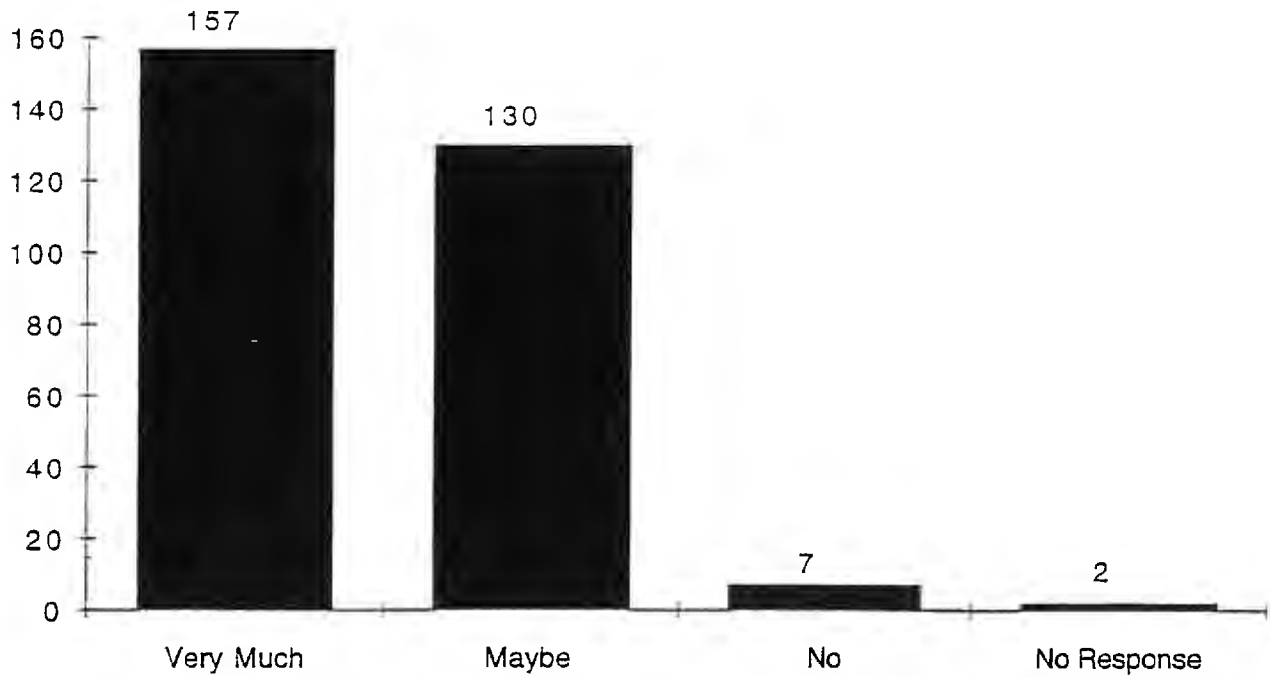


FIGURE 8A: Interest in having a vision specialist as a guest speaker- All institutions.

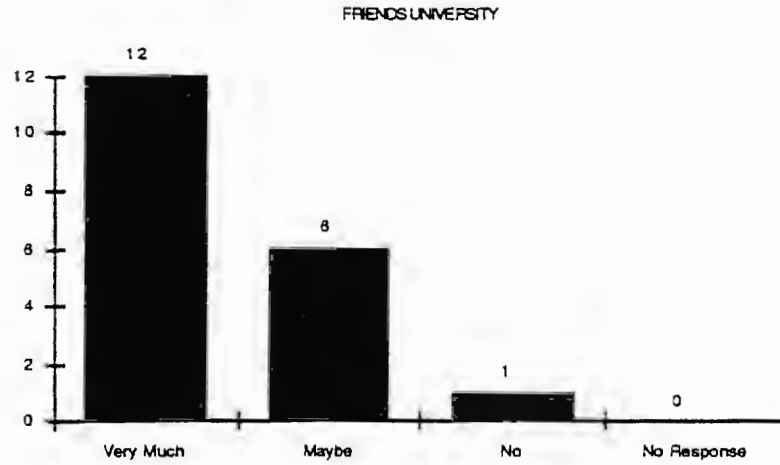


FIGURE 8B: Interest in having a vision specialist as a guest speaker- Friends University.

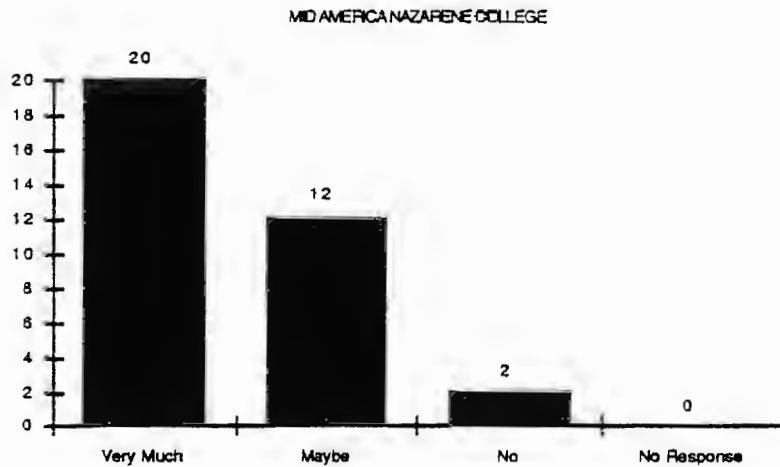


FIGURE 8C: Interest in having a vision specialist as a guest speaker- Mid America Nazarene College.

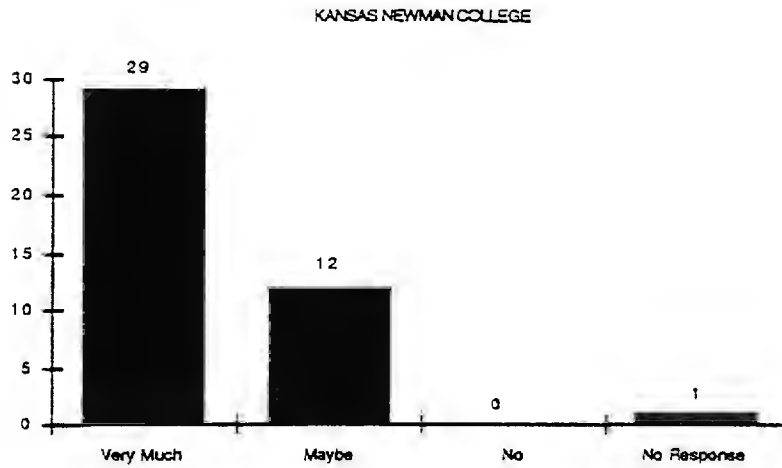


FIGURE 8D: Interest in having a vision specialist as a guest speaker- Kansas Newman College.

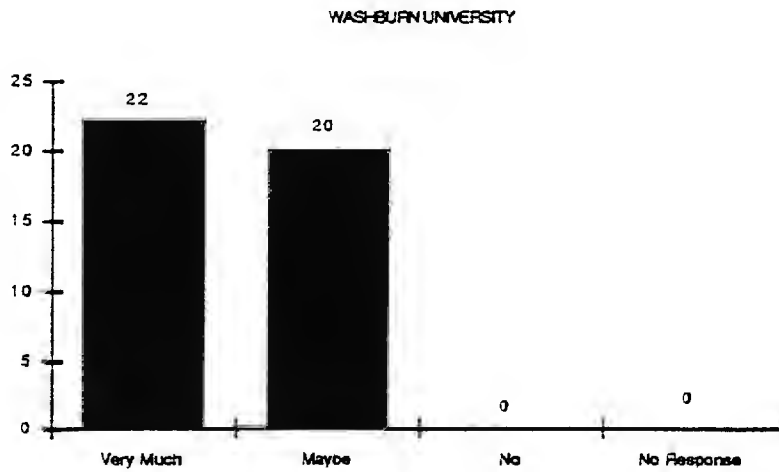


FIGURE 8E: Interest in having a vision specialist as a guest speaker- Washburn University.

| | YES | NO | NO RESPONSE |
|-----------------------------------|--------------|-------------|-------------|
| FRIENDS UNIVERSITY (19) | 12 (63.16%) | 7 (36.84%) | 0 (0.00%) |
| MID AMERICA NAZARENE COLLEGE (34) | 20 (58.82%) | 12 (35.29%) | 2 (5.88%) |
| KANSAS NEWMAN COLLEGE (42) | 24 (57.14%) | 14 (33.33%) | 4 (9.52%) |
| WASHBURN UNIVERSITY (42) | 24 (57.14%) | 13 (30.95%) | 5 (11.90%) |
| KANSAS STATE UNIVERSITY (159) | 100 (62.89%) | 45 (28.30%) | 14 (8.81%) |
| TOTALS | 180 | 91 | 25 |
| PERCENTAGE OF RESPONSES | 60.81% | 30.74% | 8.45% |

TABLE 9: Interest in receiving more information on the visual system and how it impacts the learning and reading process.

QUESTION EIGHT:

Would you be interested in more information on the visual system and how it impacts the learning and reading process?

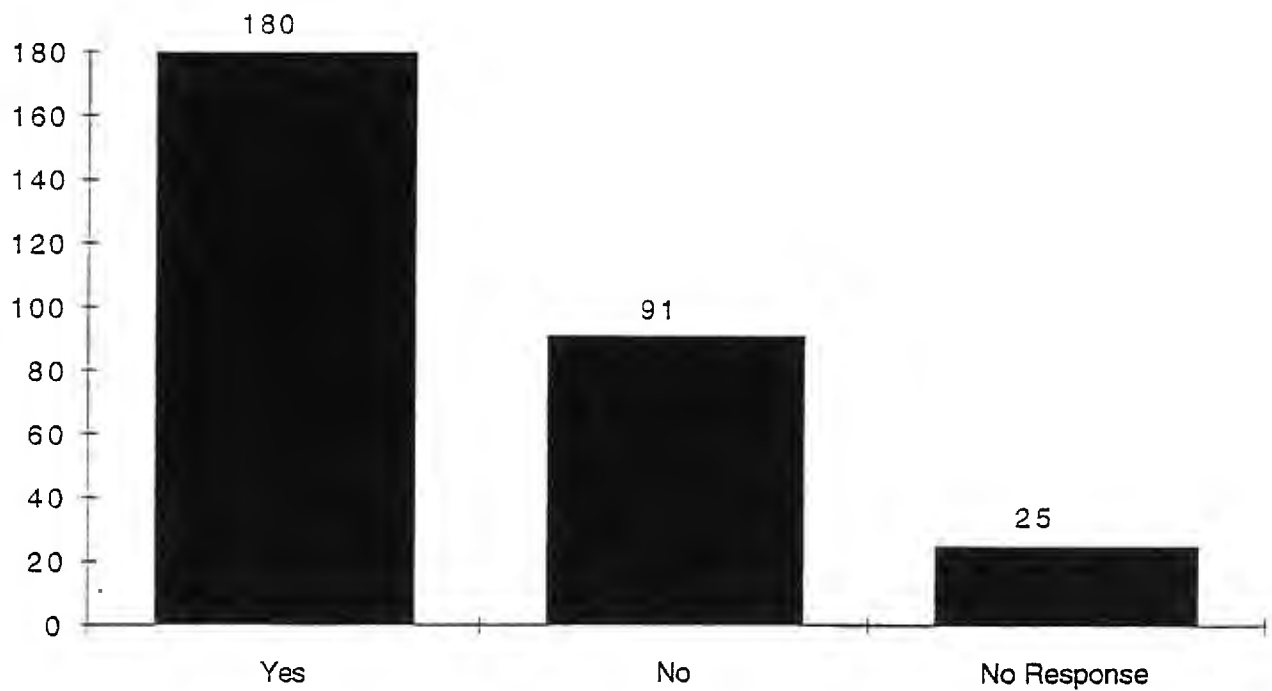


FIGURE 9A: Interest in receiving more information on vision and learning- All institutions.

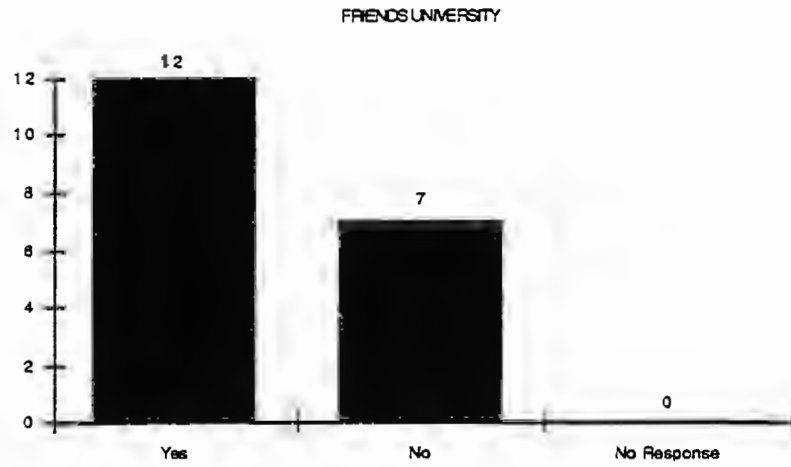


FIGURE 9B: Interest in receiving more information on vision and learning- Friends University.

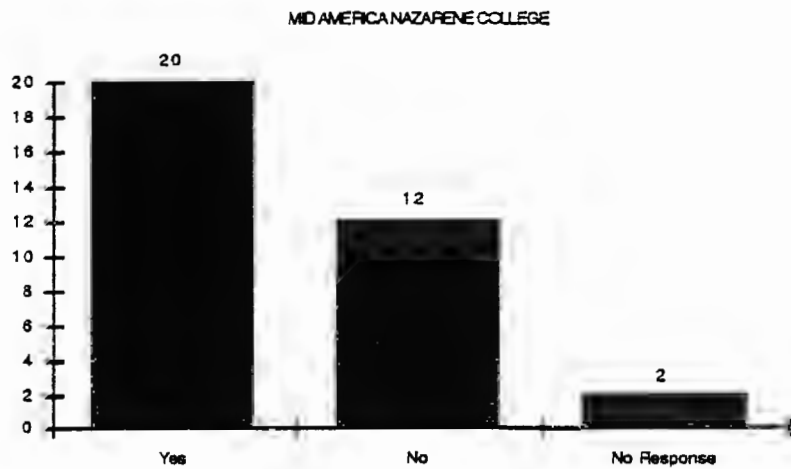


FIGURE 9C: Interest in receiving more information on vision and learning- Mid America Nazarene College.

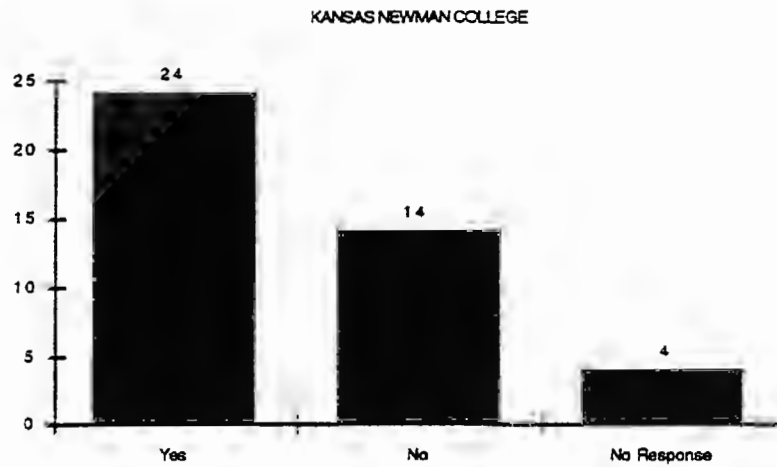


FIGURE 9D: Interest in receiving more information on vision and learning- Kansas Newman College.

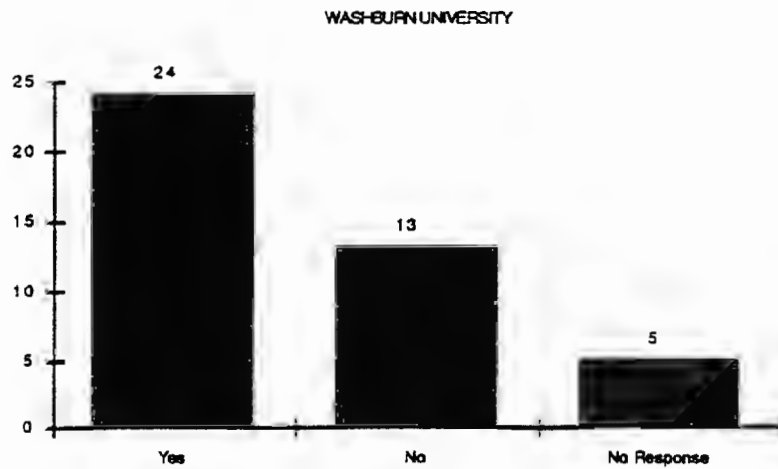


FIGURE 9E: Interest in receiving more information on vision and learning- Washburn University.

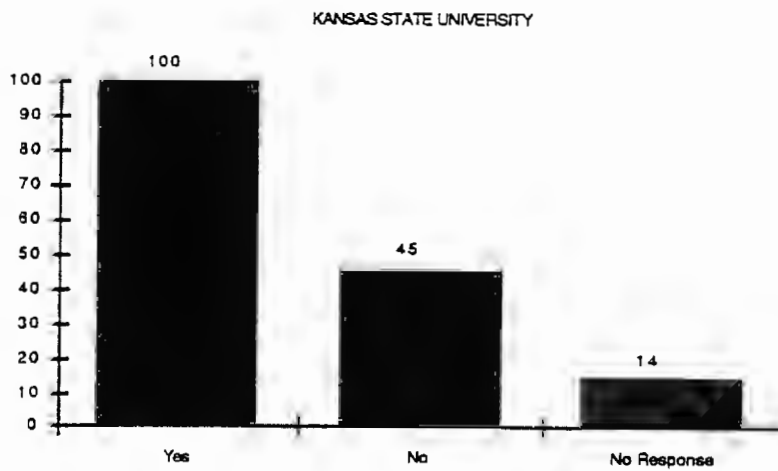


FIGURE 9F: Interest in receiving more information on vision and learning- Kansas State University.

| | YES | NO | NO RESPONSE |
|---|---------|--------|-------------|
| ELEMENTARY (203) | 75.37% | 24.14% | 0.49% |
| SPECIAL EDUCATION (3) | 33.30% | 66.70% | 0.00% |
| SECONDARY (35) | 85.71% | 14.29% | 0.00% |
| READING SPECIALIST (0) | 0.00% | 0.00% | 0.00% |
| SPECIAL EDUCATION AND OTHER (0) | 0.00% | 0.00% | 0.00% |
| ELEMENTARY AND OTHER (5) | 80.00% | 20.00% | 0.00% |
| SECONDARY AND OTHER (3) | 66.70% | 33.30% | 0.00% |
| ELEMENTARY AND SPECIAL (25) | 92.00% | 8.00% | 0.00% |
| SECONDARY AND SPECIAL (2) | 100.00% | 0.00% | 0.00% |
| ELEMENTARY AND SECONDARY (7) | 85.71% | 14.29% | 0.00% |
| ELEMENTARY AND READING SPECIALIST (3) | 66.70% | 33.30% | 0.00% |
| SECONDARY AND READING SPECIALIST (0) | 0.00% | 0.00% | 0.00% |
| OTHER (3) | 66.70% | 33.30% | 0.00% |
| ELEMENTARY, SPECIAL, SECONDARY, OTHER (1) | 100.00% | 0.00% | 0.00% |
| ELEMENTARY, SECONDARY, OTHER (2) | 50.00% | 50.00% | 0.00% |
| ELEMENTARY, SPECIAL, OTHER (3) | 100.00% | 0.00% | 0.00% |

TABLE 10: Comparison of education discipline(s) and whether or not students were familiarized with behaviors and symptoms that could indicate vision problems.

| | EXTENSIVE | MODERATE | NOT AT ALL | NO RESPONSE |
|---|-----------|----------|------------|-------------|
| ELEMENTARY (203) | 7.39% | 76.35% | 15.27% | 0.99% |
| SPECIAL EDUCATION (3) | 33.30% | 0.00% | 66.70% | 0.00% |
| SECONDARY (35) | 2.86% | 71.43% | 25.71% | 0.00% |
| READING SPECIALIST (0) | 0.00% | 0.00% | 0.00% | 0.00% |
| SPECIAL EDUCATION AND OTHER (0) | 0.00% | 0.00% | 0.00% | 0.00% |
| ELEMENTARY AND OTHER (5) | 20.00% | 40.00% | 20.00% | 0.00% |
| SECONDARY AND OTHER (3) | 0.00% | 33.30% | 33.30% | 33.30% |
| ELEMENTARY AND SPECIAL (25) | 16.00% | 80.00% | 4.00% | 0.00% |
| SECONDARY AND SPECIAL (2) | 0.00% | 100% | 0.00% | 0.00% |
| ELEMENTARY AND SECONDARY (7) | 0.00% | 100% | 0.00% | 0.00% |
| ELEMENTARY AND READING SPECIALIST (3) | 0.00% | 0.00% | 100% | 0.00% |
| SECONDARY AND READING SPECIALIST (0) | 0.00% | 0.00% | 0.00% | 0.00% |
| OTHER (3) | 0.00% | 66.70% | 33.30% | 0.00% |
| ELEMENTARY, SPECIAL, SECONDARY, OTHER (1) | 0.00% | 100.00% | 0.00% | 0.00% |
| ELEMENTARY, SECONDARY, OTHER (2) | 0.00% | 100.00% | 0.00% | 0.00% |
| ELEMENTARY, SPECIAL, OTHER (3) | 66.70% | 33.30% | 0.00% | 0.00% |

TABLE 11: Comparison of education discipline(s) and extent to which visual impairment with regards to PL 94-142 was addressed.

| | COMPREHENSIVELY | SOMEWHAT | NOT AT ALL | NO RESPONSE |
|--|-----------------|----------|------------|-------------|
| ELEMENTARY (203) | 9.85% | 76.35% | 11.82% | 1.48% |
| SPECIAL EDUCATION (3) | 33.30% | 66.70% | 0.00% | 0.00% |
| SECONDARY (35) | 20.00% | 68.57% | 8.57% | 2.86% |
| READING SPECIALIST (0) | 0.00% | 0.00% | 0.00% | 0.00% |
| SPECIAL EDUCATION AND OTHER (0) | 0.00% | 0.00% | 0.00% | 0.00% |
| ELEMENTARY AND OTHER (5) | 20.00% | 80.00% | 0.00% | 0.00% |
| SECONDARY AND OTHER (3) | 0.00% | 100.00% | 0.00% | 0.00% |
| ELEMENTARY AND SPECIAL (25) | 24.00% | 68.00% | 8.00% | 0.00% |
| SECONDARY AND SPECIAL (2) | 0.00% | 100.00% | 0.00% | 0.00% |
| ELEMENTARY AND SECONDARY (7) | 14.29% | 71.42% | 14.29% | 0.00% |
| ELEMENTARY AND READING SPECIALIST (3) | 33.30% | 33.30% | 33.30% | 0.00% |
| SECONDARY AND READING SPECIALIST (0) | 0.00% | 0.00% | 0.00% | 0.00% |
| OTHER (3) | 0.00% | 66.70% | 33.30% | 0.00% |
| ELEMENTARY, SPECIAL SECONDARY, OTHER (1) | 0.00% | 100.00% | 0.00% | 0.00% |
| ELEMENTARY, SECONDARY, OTHER (2) | 0.00% | 100.00% | 0.00% | 0.00% |
| ELEMENTARY, SPECIAL OTHER (3) | 33.30% | 66.70% | 0.00% | 0.00% |

TABLE 12: Comparison of education discipline with regards to whether or not vision as it applies to learning was addressed in the student's class(es).

| | COMPREHENSIVELY | SOMEWHAT | NOT AT ALL | NO RESPONSE |
|-----|-----------------|----------|------------|-------------|
| YES | 4.50% | 61.80% | 12.20% | 0.68% |
| | | | | |
| NO | 6.80% | 12.50% | 1.40% | 0.34% |

TABLE 13: Comparison of positive or negative response to whether or not student was familiarized with behaviors or symptoms of vision problems and to what extent vision as it applies to learning was addressed in their class(es).

RESULTS (Educators)

Question 1: Please indicate which area(s) of education you teach. Check all that apply.

The largest response was from those educators involved in the instruction of elementary education, accounting for 7 of the 21 respondents (33.33%). The remaining categories were fairly evenly spread. For complete graphical display, refer to Figure 10.

Question 2: Do any of your lectures discuss symptoms and behaviors which could indicate difficulties that are related to vision?

The majority of educators, 12 of 21 (57.14%), replied affirmatively to this inquiry, while 8 of 21 (39.10%) reported not touching upon this topic in their lectures. One person (4.76%) did not respond. Complete graphical display may be found in Figure 11.

Question 3: With regards to severe visual impairment, how in depth is your coverage of this disability in comparison to Public Law 94-142?

9.52% (2 of 21) of educators replied that they provided detailed coverage of this subject, while 28.57% (6 of 21) responded that they provided somewhat detailed coverage. Five educators (23.81%) denied covering the subject area at all, and eight educators (38.10%) did not respond. Interestingly enough, if one were to eliminate the non-respondents, only 15% discussed this topic in detail, while 46% provided somewhat detailed coverage and most disturbingly, 39% of those educators responding to this question denied discussing this topic at all. Complete data display can be found in Figure 12.

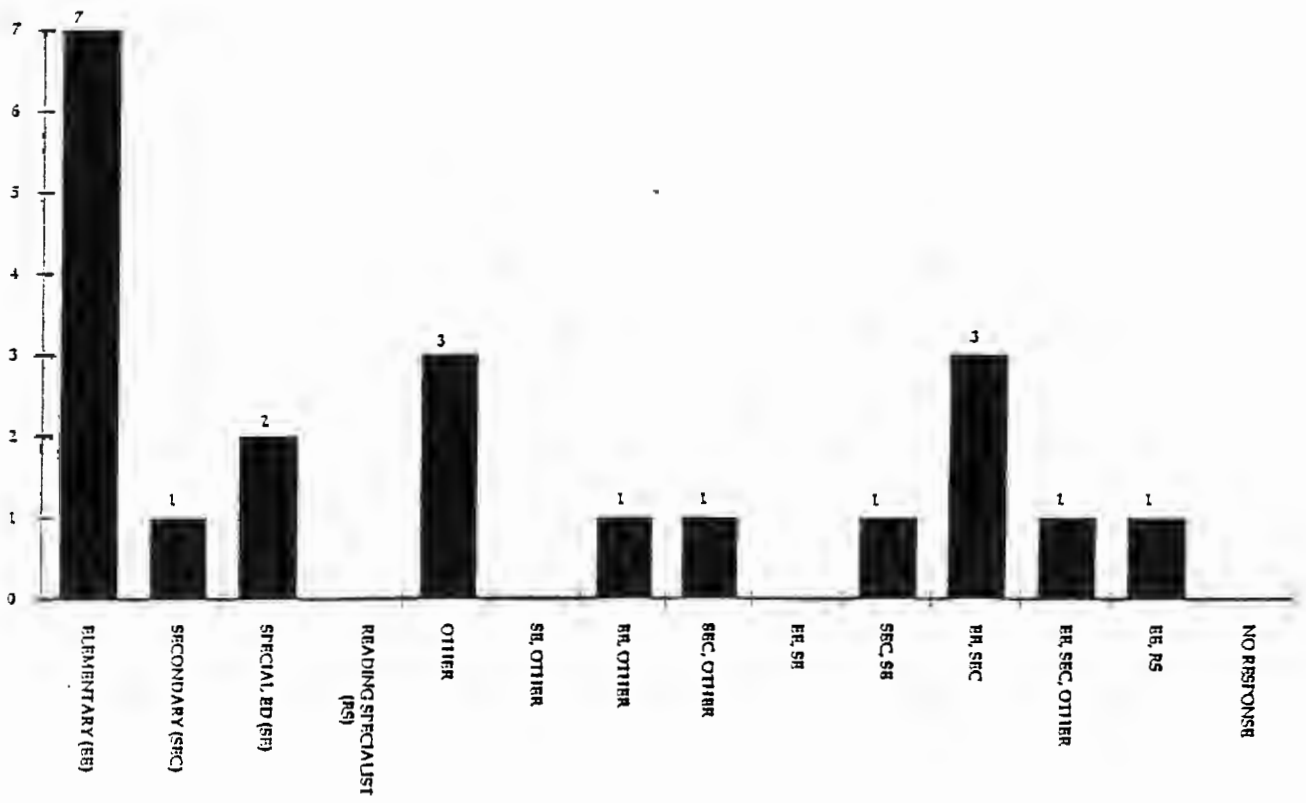


FIGURE 10: Educator's area(s) of expertise.

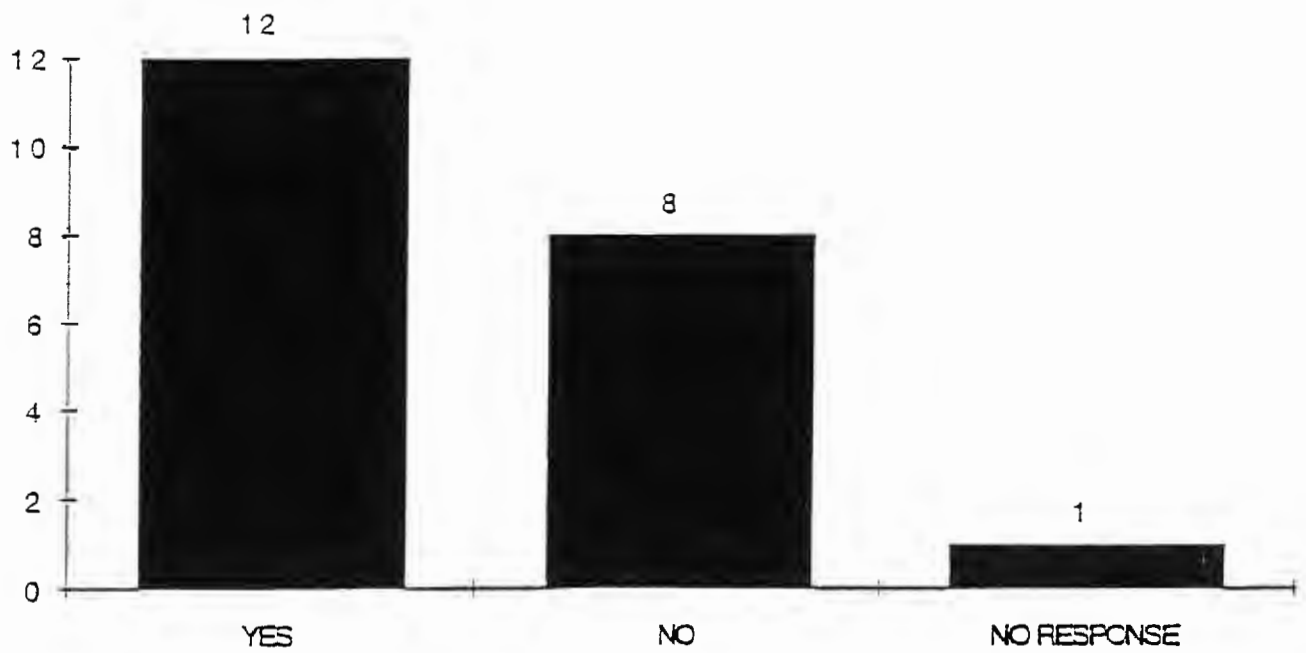


FIGURE 11: Educator's discussion of symptoms and behaviors related to visual difficulties.

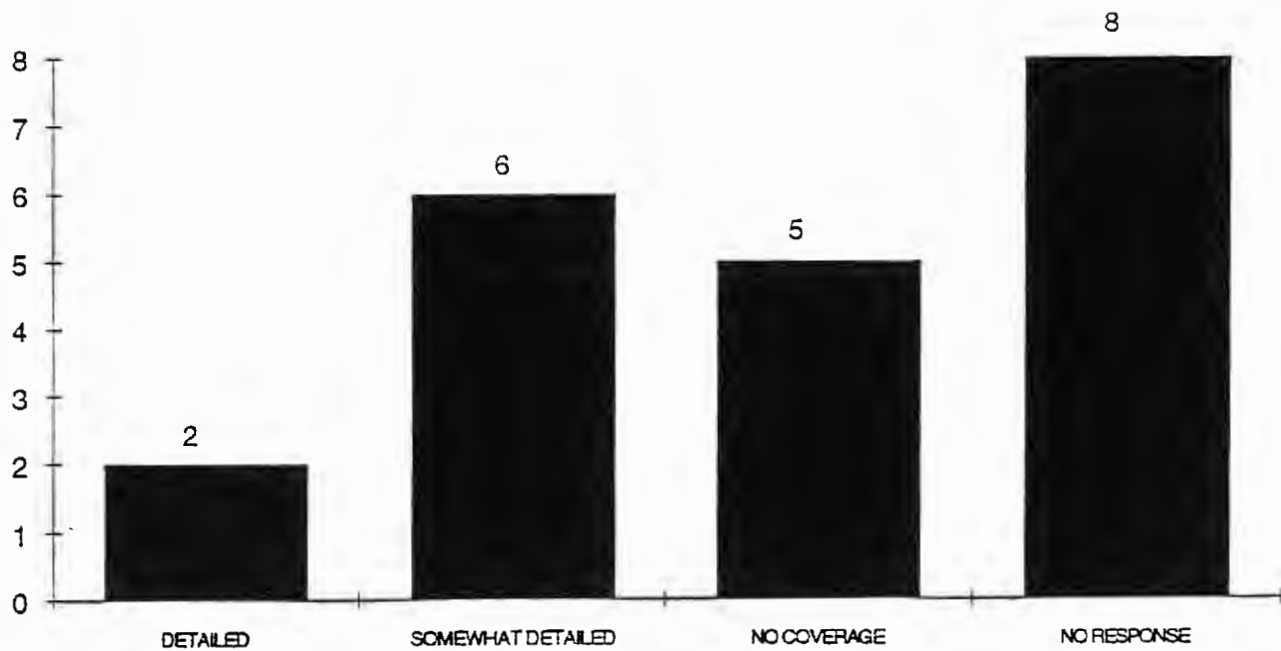


FIGURE 12: Educator's depth of coverage of visual impairment with regards to PL 94-142.

Question 4: Please mark each area of vision that you discuss in your classroom.

Of the twelve educators responding to this question, 75% indicated coverage of 'Eye-Hand Coordination', while 50% replied that they provided coverage of 'Visual Memory', 'Tracking' and Visual Perception'. 41.67% indicated that they touched upon the topics of 'Myopia' and 'Hyperopia'. 25% talked about astigmatism in their classes, and 8.33% indicated at least some coverage of 'Accommodation', 'Binocular Vision' and 'Color Vision'. Complete display of results may be found in Figure 13. In addition, Table 14 exhibits the percentage of students indicating a 'poor understanding' of these vision terms compared to the percentage of educators not discussing the same terms.

Question 5- Part I: What textbook(s) do you use in your course(s)?

TITLE:

AUTHOR(S):

| | |
|---|------------------------------------|
| Exceptional Learners | Hallahan & Kauffman |
| Exceptional Learners | Hallahan & Kauffman |
| Teaching students with special needs in multiple settings | Smith, Polloway, Patton & Dowdy |
| Educational Psychology | Woolfolk |
| Educational Psychology | Woolfolk |
| Foundations of Education | |
| Reading with Writing Connections | Heller |
| Exceptional Children (5th ed.) | Heward |
| Those who can Teach | Ryan & Cooper |
| Instructing students who have literacy problems | McCormick |
| Teaching Children to Read | Reutzel & Cooter |
| Literacy: Helping children construct meaning | Cooper |
| Introduction to Special Education | Smith & Luckasson |
| Teaching Special Students in the Mainstream | Lewis & Doorlag |
| Teaching Students with mild disabilities | Bender |
| Including students with special needs | Friend & Brussuer |

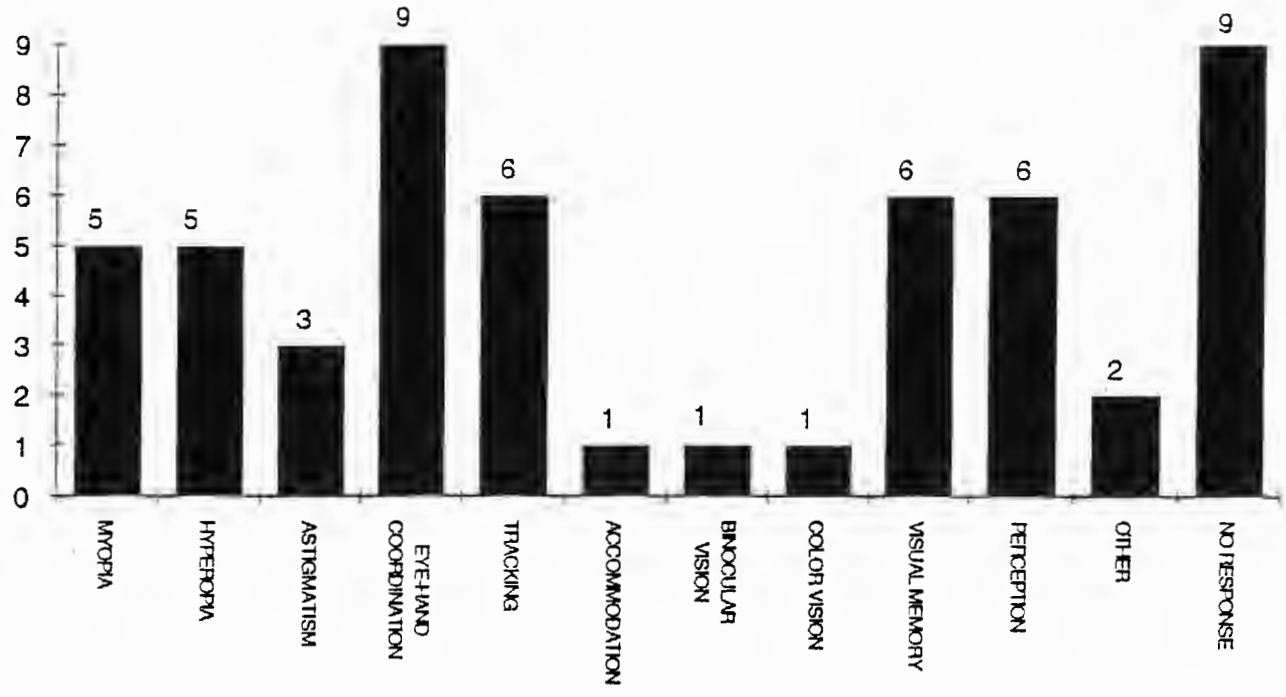


FIGURE 13: Aspects of vision discussed in education courses.

| | Myopia | Hyperopia | Astigmatism | Eye-Hand Coordination | Eye Tracking | Accommodation | Binocularity | Color Vision | Visual Memory | Visual Perception |
|-----------|--------|-----------|-------------|-----------------------|--------------|---------------|--------------|--------------|---------------|-------------------|
| Students | 25.30% | 24.10% | 40.30% | 19.75% | 30% | 39.20% | 55.20% | 34.20% | 32.60% | 31.20% |
| Educators | 41.70% | 41.70% | 25% | 75% | 50% | 8.30% | 8.30% | 8.30% | 50% | 50% |

TABLE 14: Percentage of students indicating 'poor understanding' of a vision term versus the percentage of educators not discussing the same term.

Question 5 Part- II: Does this (these) text(s) include sections on vision in the classroom environment?

Of the twelve educators responding to this question, 75% reported that the text(s) they used included some sort of coverage of vision and learning. The depth of coverage, however, was not divulged. For graphical display of results, see Figure 14.

Question 6- Part I: Do you invite guest lecturers to speak to your class(es) about the role of vision in learning?

Two of the twelve respondents (16.67%) replied that they invited guest speakers regularly (at least annually), while 75% indicated that they rarely invited guest speakers, and only one educator (8.33%) reported inviting guest lecturers only occasionally. For a complete display of results, see Figure 15.

Question 6- Part II: If a guest speaker was invited, what was this person's profession?

Only three educator's responded to this question. One indicating that their guest speaker was an ophthalmologist and two educators had invited the mother of a blind child as their guest speaker. Complete graphical display, see Figure 16.

Question 7: Would you be interested in having a vision specialist lecture about vision and how it relates to learning in your class(es)

23.81% (5 of 21) responded that they would 'very much' like to have a vision specialist give a guest talk on vision and learning. 33.33% (7 of 21) thought that they may enjoy having a vision specialist give a talk, while 38.10% (8 of 21) reported no interest in having a vision specialist as a guest speaker. There was one person (4.76%) did not respond to this question. Complete graphical display of the data may be found in Figure 17.

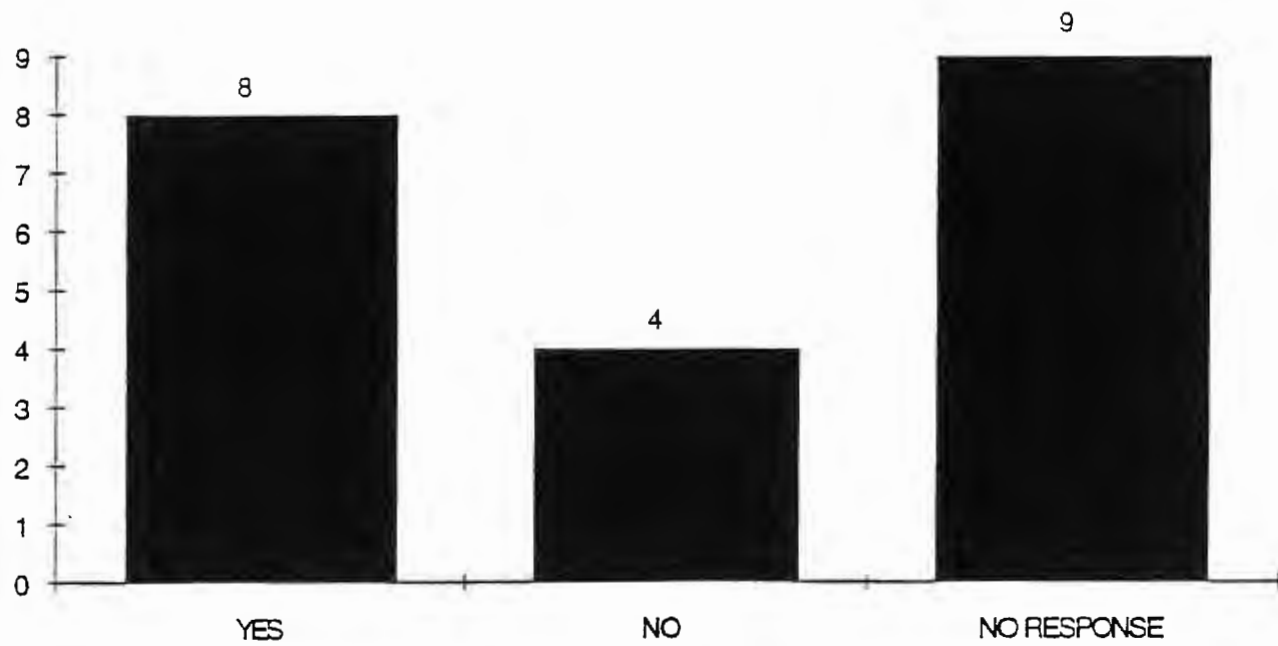


FIGURE 14: Inclusion of vision discussion in text(s) used by educators.

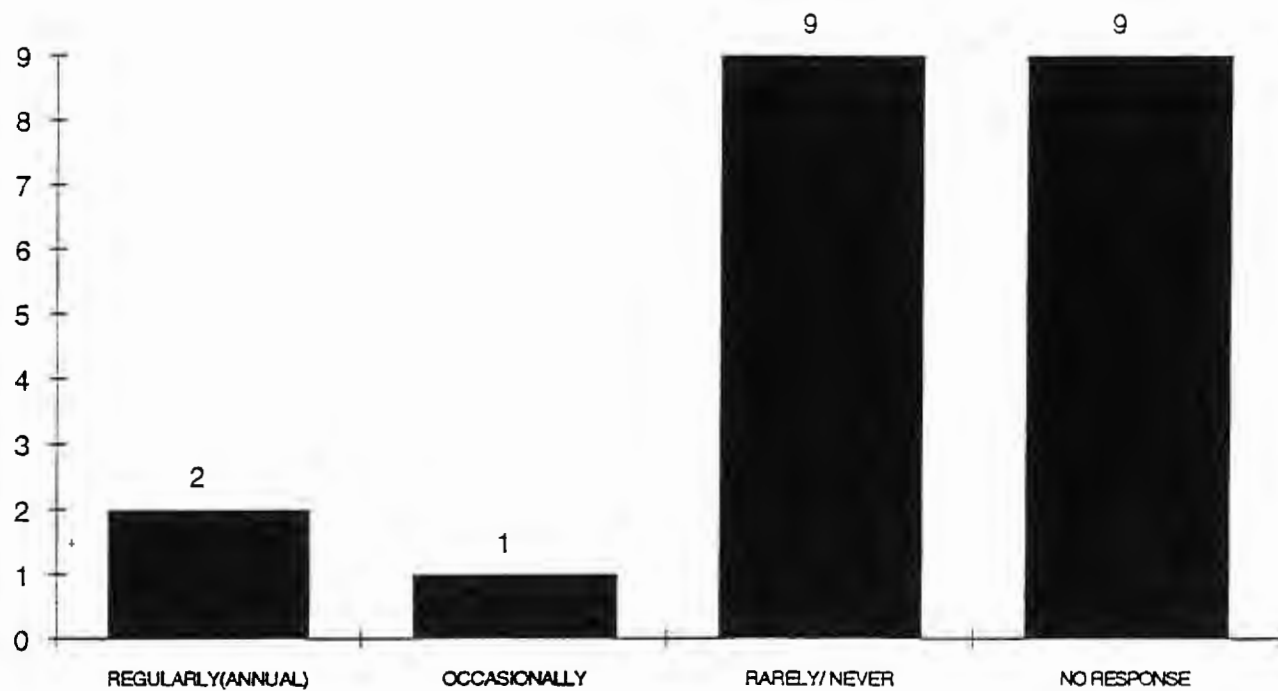


FIGURE 15: Frequency of guest speakers.

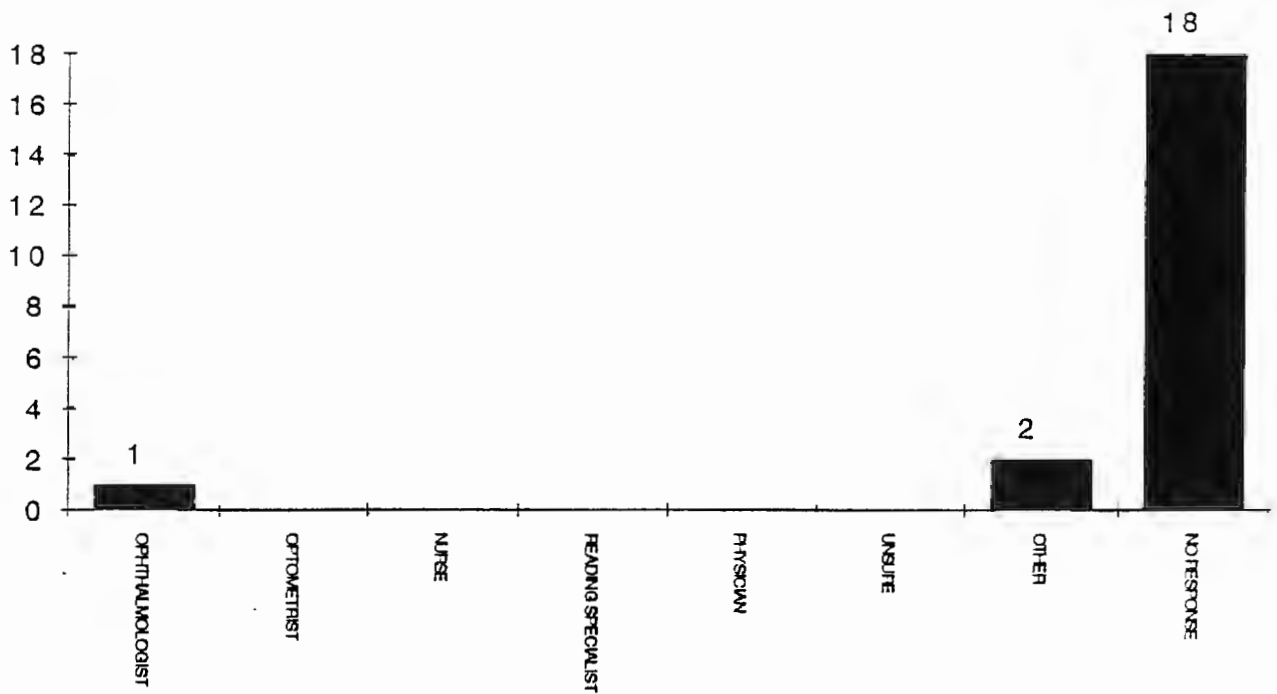


FIGURE 16: Profession of guest speakers.

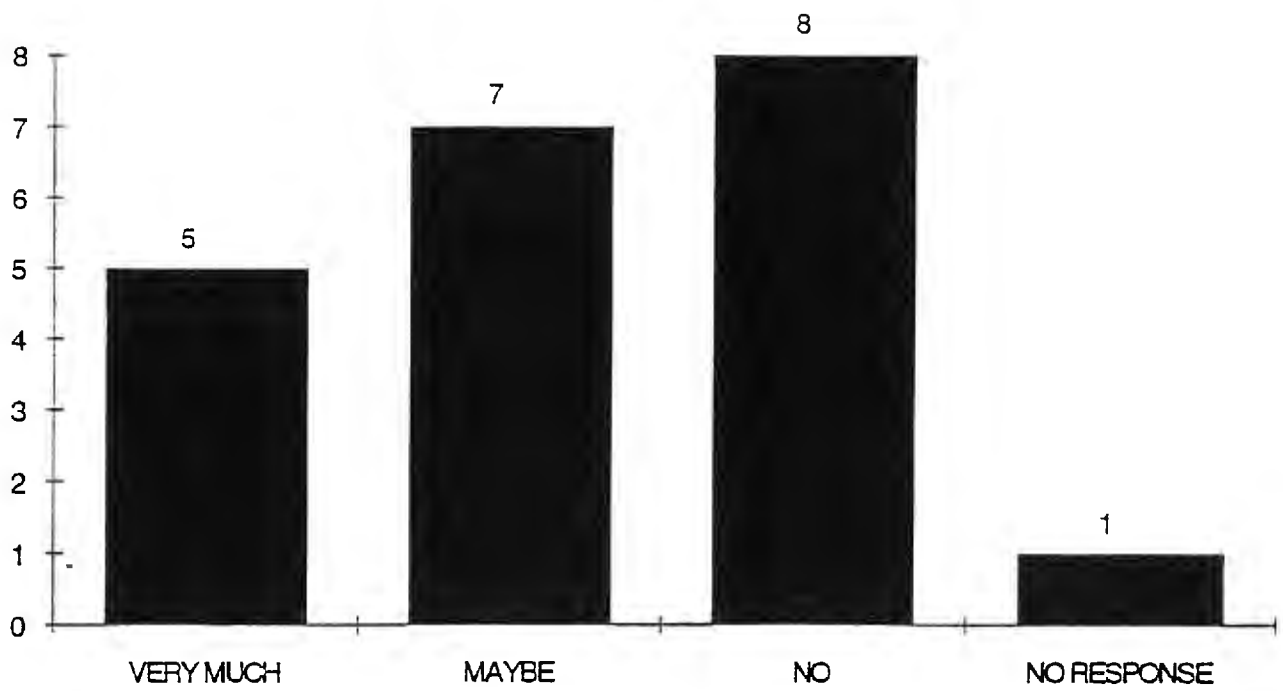


FIGURE 17: Interest in having vision specialist as a guest speaker.

Question 8: Would you be interested in obtaining more information on the visual system and how it impacts the learning and reading process?

Response to this question was split right down the middle, with ten affirmatives and ten negatives. Only one person did not respond to this question. For complete graphical display of data, refer to Figure 18.

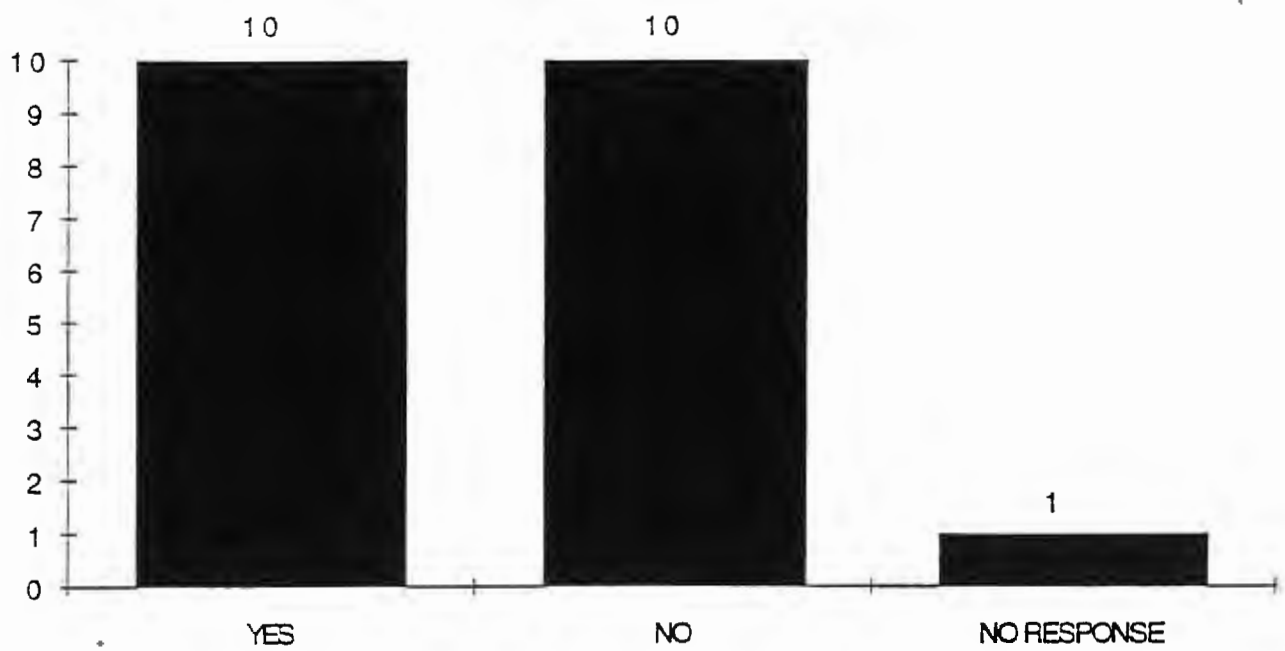


FIGURE 18: Interest in receiving additional information on vision and learning.

DISCUSSION and IMPLICATIONS

This was a two part study using a survey format. One part of the study involved questioning future classroom teachers about how they were educated regarding vision and the learning process. The other part of the study included surveying the education professors in an attempt to find how they taught about vision as it relates to the learning process in their classes. It was hoped that including both populations would provide the investigator with additional, valuable information

The first question that needed to be answered was what area(s) or discipline(s) within education were the respondents interested. It was postulated in the beginning phases of this study that those persons choosing special education or elementary education as their area(s) of emphasis may have a greater knowledge base concerning vision and the learning process. The basis for making such a bold supposition was that these persons were typically the educators in the best position to notice suspect visual behaviors or adaptations early in a child's academic career. As a consequence, it was felt that these educators may be given more specific instruction than some of their colleagues regarding early detection and remediation of possible learning related vision difficulties.⁵⁵

It was found that the great majority of respondents, who were future elementary educators, replied that they had been familiarized with behaviors and symptoms that could indicate learning related vision problems. In fact, over 75% of the 203 elementary education respondents replied affirmatively to this question. What this also means, however, is that there were nearly 25% of future elementary educators receiving no instruction whatsoever regarding symptoms and behaviors of poor visual processing. If one were to

equate these percentages to grades, education would be getting a "C" for its knowledge of vision as it relates to learning. Two glaring surprises appeared upon further evaluation of these results. Two thirds of future special education respondents had received no information regarding possible adaptive behaviors and/or symptoms indicative of vision difficulties. Secondly, it was found that of the 35 secondary education respondents, over 85% had had the benefit of at least minimal coverage of behavioral adaptation and symptoms indicative of vision difficulties. In addition, of the 25 people who indicated that both elementary *and* special education were to be their areas of emphasis, fully 92% replied that they had received 'some coverage' of behaviors and adaptations to vision difficulties in their core education course(es). The remaining education 'disciplines' were too scattered and had so few respondents that it was not possible to obtain definitive answers to this inquiry with any degree of certainty.

Almost as an extension of the previous question, the next area of interest was whether the student's future discipline influenced the extent to which visual impairment, with regards to PL 94-142, was addressed in their class work. Taking a purely cursory overview, it was readily apparent that the great majority of students felt that they had received 'moderate coverage' of the topic. In fact, just over 76% of future elementary educators and 71% of future secondary educators indicated that they had received 'moderate coverage'. Of the 25 elementary education/special education respondents, 80% indicated a 'moderate coverage' of visual impairment with regards to PL 94-142. Although these results also found that 15% of elementary educators, 25% of secondary educators and 4% of elementary/secondary combination educators did not receive any instruction at all in this area, the percentage of responses to at least 'moderate coverage' of the topic was slightly

encouraging. It was initially anticipated, however, that there would have been a higher percentage of students receiving information involving vision and PL 94-142. It was thought that because PL 94-142 is a federally mandated law, 100% (or at least very close to that percentage) of future classroom teachers would be knowledgeable regarding all its nuances. One possible explanation for the less than 100% result is that many of the respondents hadn't had the course(s) in which it was addressed.

Another question that was probed somewhat, was whether or not the student's future area(s) of emphasis had any effect on their exposure to vision, as it applies to learning, in their class(es). The results of this analysis were nearly identical to those of the previous question: The large majority of students indicated that vision, as it applies to learning in the classroom, was covered in 'some detail.' Almost 77% of future elementary educators and 68.5% of future secondary educators replied that vision and learning was covered 'somewhat,' while only about 12% and 9% respectively denied having ever been acquainted with the topic. Further, 68% of future elementary education/special education respondents revealed there to be 'somewhat detailed' coverage of the topic of vision as it applies to learning, while 32% had received 'comprehensive' coverage.

Discussion of vision terms and their meanings was a question that provided possibly the greatest insight into what future classroom teachers are being taught about vision. As evident by their responses, most future classroom teachers have a very minimal understanding of what vision truly is and how it can impact how the child learns. In fact, between 25 and 55% of the respondents were unclear on every single vision term asked of them. More alarming than anything else was their lack of lack of understanding of such visual terms as accommodation, binocular vision, visual memory and

visual perception. Of all the terms listed on the questionnaire, these arguably have the most direct ramifications on the reading and learning process. After all, if a child can't focus on their material, if they see their assignments as two instead of one, or they can't remember what they just read, how can they be expected to learn. Given this, isn't it slightly disconcerting to find our future classroom teachers know so little about these areas of vision?

The final area of interest lay in whether or not students' positive or negative responses to familiarization with behaviors or symptoms of vision problems affected the way they answered the question regarding the extent vision as it applies to learning was addressed in their class(es). In other words, if a student had indicated that they had received instruction on various behaviors and/or symptoms that could indicate a learning related vision problem, in how much depth had vision, as it applies to learning, been addressed in their class(es). The results of this comparison revealed that the overwhelming majority, almost 62%, of those students who had been familiarized with behaviors and symptoms of vision problems had received 'somewhat detailed' coverage of vision and the learning process. These results suggest the obvious: The more one discusses a topic, the broader the understanding of the subject becomes.

The second part of this study involved the education professors responsible for the instruction given to those students in their final two years of the education curriculum. The purpose for this group's inclusion in the study was two fold. First, it was anticipated that a profile of those educating future classroom teachers would provide the author with an idea of how in depth vision and learning was being taught at schools and colleges of education. The second reason for their inclusion was to determine *their* knowledge base of vision as it relates to learning.

It was decided to first determine whether educators even discussed symptoms and behaviors suggestive of visual difficulties. Somewhat encouragingly, 60% of the education professors responding indicated that they talked about vision and learning. This response rate nearly mirrors the students' responses to this same question (almost 80% of students replied affirmatively). This suggests that the 'message' these educators were delivering was being received. What this also means, however, is that 40% of education professors don't feel the need to include a section on vision difficulties and how students will adapt to them.

Of the thirteen educators responding to the question of depth of coverage of visual impairment with regards to PL 94-142, just over 56% indicated that they had covered the topic in a 'somewhat detailed' manner. Again, this mirrors the students' response to this same question (74% of students had received some coverage of the topic). At first glance, these results were surprisingly low to the author, but following further analysis, it was discovered that many of the educators had actually replied to this question by *writing in* that although they personally did not cover this topic, it was touched upon in other education course(s). Knowing this, it was determined that this question may not reflect the true response rate of a larger number of subjects.

When it came to discussing aspects of vision in their education courses, the item receiving the most attention was eye-hand coordination. Some of the other areas that received attention from at least half of the respondents were tracking, visual memory and visual perception. On the other hand, the areas of accommodation, binocular vision and color vision were the topics receiving the least amount of coverage, with only one educator talking about each. These results matched the students' responses

almost identically. In fact, students felt more comfortable with eye-hand coordination than any other topic, and least comfortable with the areas of astigmatism, accommodation, binocular vision, color vision, visual memory and visual perception.

The area causing greatest concern, however, was the educator's willingness, or lack there of, to either have a guest speaker in their class(es) or receive more information on the topic of vision and learning. Forty percent of the responding educators did not wish to have a vision specialist as a guest speaker in their class, while fully fifty percent didn't want any additional information of vision and learning. There is no clear reason why so many professors do not want 'outside' input on this topic in their class(es). Perhaps it's because they feel that additional material to an already crammed academic year is not feasible, or maybe they feel that the texts they use and the lectures they present are adequate for their students' purposes. Whatever the reason, this investigator feels that the students' inept knowledge of vision concepts, as evidenced in this survey, speaks volumes.

Although somewhat informative and well intentioned, there exist a number of flaws in this study. Upon first glance, for example, the low overall response rate (30.8% of students and 16.8% of educators) may be somewhat disconcerting. It must be explained, however, that this poor response rate is the result of a "shotgun" approach to the distribution of surveys. The author felt it imperative that there be enough surveys for each target population, and as a consequence, purposefully sent more questionnaires than necessary. If future replications or variations of this study were to be pursued, it would be recommended that the exact population sizes be determined prior to the distribution of surveys.

Of greater significance than the low total response rate, is the fact that there was an extremely low number of educators replying to the survey (21 total). Unlike the student respondents (numbering 296 total), this small number of educator responses made it impossible to form generalizations with any degree of certainty. It was felt that this poor response rate was secondary to perceived time constraints, improper or incomplete distribution of the surveys by the department or college head, or simply a general disinterest in the topic being explored. Future investigators may choose to go to each university and distribute the surveys in person and/or send each educator a personalized cover letter and questionnaire. Another possibility would be to distribute the surveys during a less involved time in the academic year. Additionally, future research surveys should include teachers already in the classroom. If vision and learning is covered in one specific course near the end of the program, teachers already in the field might have a higher knowledge than students still in training.

As previously mentioned, there was a large number of student respondents (296 total). However, of the 296 respondents, 159 were from Kansas State University. The problem with having this percentage of responses from one university (59.1%) is that there may be an added emphasis or perhaps even lack of attention to the topic under investigation. With a response pool this large from one institution, there was concern that overall results may have easily been skewed. It was for this reason that the author chose to analyze and display the data from each institution separately as well as combined with one another. Interestingly enough, when looking at each question on an institution by institution basis, the percentage results were nearly identical across the board; the results from Kansas State University apparently not skewing the overall findings. This provides

validation for some of the conclusions that were drawn throughout the course of this survey, but over-generalizations should not be drawn from this single study.

Finally, there is one last point that needs to be made. This survey asked education students to indicate their level of understanding concerning a number of vision-related terms and concepts. In essence, this question was asking for their *perception* of what they believed they knew. Obviously, whenever one is asked to make a judgment between terms such as 'moderate,' 'extensive,' and 'somewhat' or 'detailed,' there are bound to be different criteria applied based solely on the individual. Perhaps a better way to determine what they truly understood would have been to administer a short "test" about vision and its impact on the learning process after they'd completed the survey. If future replications of this study were to be pursued, this author would strongly urge such a 'test' be included in every survey packet.

Because the only vision test required by the state of Kansas for school age children is Snellen visual acuity, only a very small minority of children with a learning related vision problem will be identified. The inadequacies of the Snellen visual acuity test are why it is of utmost importance for future educators to be knowledgeable of possible behaviors and adaptations that may indicate a child with visual difficulties. Obviously this assumes that once a potential vision problem is identified by an educator, there are enough practitioners capable of treating functional vision problems located close enough to make treatment feasible. This also assumes that parents will follow up the educator's recommendation regarding the potential vision problem, and seek treatment. At the beginning of this survey, it was anticipated that very few future educators were receiving much more than

cursory coverage of vision and the learning process. At the end of this survey it was found that between 70 and 80% of future educators are receiving at least some guidance and tutelage in the area of vision and learning. The degree to which these future classroom teachers were being instructed regarding vision and the learning process is not entirely clear at this point in time. Hopefully future investigators will modify this study to include a more thorough test of vision knowledge. Nevertheless, it is heartening to find some education professors are making an effort to include the topic of vision in their lectures and that their students are retaining at least a portion of that information.

How can we improve upon the understanding of vision in the learning environment? One way would include using education textbooks with fairly comprehensive sections on vision and commonly encountered visual difficulties in the school age population. Texts such as Diagnosis and Remediation of the Disabled Reader by Ekwall and Shanker⁵⁶ or Diagnosing and Correcting Reading Disabilities by Spache⁴³ are excellent guides to educators on understanding vision and the various visual difficulties students may encounter in the classroom. In selecting a text to be used, though, it is imperative that one critically review the material presented and question whether or not the arguments regarding vision and its effects on learning are valid or even current. Some texts, such as Instructing Students with Literacy Problems by McCormick⁵⁷ would have one believe that visual acuity is the only vision process that affects learning and that any viewpoint to the contrary is heresy.

Another way to increase the quantity and quality of information presented to education students would be for eye care professionals with a background in education to volunteer their time and expertise. With this unique perspective on the relationship between vision and learning, who

better to provide guest talks to future classroom teachers? After all, it is important that the eye care profession shoulder at least as much of the burden as the classroom teacher when considering a child's visual welfare.

IMPLICATIONS of the FINDINGS:

- The poor knowledge of vision terms as well as various symptoms and behaviors indicative of vision problems has a two pronged effect. First, the classroom teacher may attempt to remediate an academic problem when there is a visual processing deficit causing the child's difficulty. By treating the symptom rather than the cause, the teacher and the student will only become frustrated with the classroom. Altering the lesson plans or greatly changing the class dynamics may sacrifice the needs of the many for the needs of the few or one.
- Poor understanding of PL 94-142 (now known as the IDEA), may result in children not receiving the attention or special educational services they need. Without a comprehensive understanding of all the nuances, including the vision section, of PL 94-142, classroom teachers are setting some children up for a difficult learning experience.
- By devoting more time and energy to addressing the topic of vision and learning in college education courses, the more adept future classroom teachers become at understanding vision concepts.
- By not including a discussion of vision and learning, as 40% of the responding education professors did, we are sending a poor message to our future classroom teachers. This lackadaisical attitude by the professors is bound to be sensed by their pupils, and before you know it, there's an entire population of classroom teachers without the foggiest notion of how vision and learning inter-relate. As a consequence, a child may be subjected to month after month of improper educational remediation, when what they may have needed all along was an eye exam.
- It's also interesting that nearly 50% of education professors didn't wish to receive additional information on vision and learning and 40% didn't want a vision specialist as a guest speaker. The implication of this piece of data is identical to the implication of not including a discussion of vision and learning- an uniformed population of teachers not knowing how vision and learning work together.

Perhaps someday, equipped with additional information on the importance of vision and learning, we will have an army of trained observers monitoring our children in the learning environment. Only when we have highly trained observers in the classroom will the inadequacies of the antiquated Snellen chart to identify those with visual difficulties be overcome. Providing the best possible vision screening for all children is still a mirage on the horizon, but with perseverance and continued cooperation between eye care professionals and educators, the importance of vision in the learning process will be realized and our goal will be attained.

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APPENDIX I

Brief descriptions of the colleges and universities included in this survey⁵⁸.

FRIENDS UNIVERSITY:

Private, independent, nonprofit institution.
Location: Wichita, KS
Founded: 1898
Degrees Awarded: Associate, baccalaureate, master's
Calendar: Semester system.
Total Enrollment: 1,533.

MID AMERICA NAZARENE COLLEGE:

Private, associated with International Church of the Nazarene.
Location: Olathe, KS
Founded: 1966
Degrees Awarded: Associate, baccalaureate, master's
Calendar: Semester system.
Total Enrollment: 1,370.

KANSAS NEWMAN COLLEGE:

Private, associated with the Roman Catholic Church.
Location: Wichita, KS
Founded: 1933
Degrees Awarded: Associate, baccalaureate
Calendar: Semester system.
Total Enrollment: 1,189.

WASHBURN UNIVERSITY:

Public, urban institution.
Location: Topeka, KS
Founded: 1865
Degrees Awarded: Associate, baccalaureate, first-professional (law), and
master's
Calendar: Semester system.
Total Enrollment: 6,626.

KANSAS STATE UNIVERSITY:

Public, state land-grant institution.
Founded: 1858
Location: Manhattan, KS
Degrees Awarded: Associate, baccalaureate, master's, doctorate
Calendar: Semester system.
Total Enrollment: 20,712.

APPENDIX II

EDUCATOR'S QUESTIONNAIRE

- Please indicate which areas of education you teach. Check all that apply.

| | |
|---|---|
| <input type="checkbox"/> Elementary | <input type="checkbox"/> Secondary |
| <input type="checkbox"/> Special Education | <input type="checkbox"/> Reading Specialist |
| <input type="checkbox"/> Other (Please specify:_____) | |

- Do any of your lectures discuss symptoms and behaviors which could indicate potential learning difficulties that are related to vision?

| | |
|------------------------------|-----------------------------|
| <input type="checkbox"/> Yes | <input type="checkbox"/> No |
|------------------------------|-----------------------------|

 If the answer is yes, please continue with the rest of the survey.
 If the answer is no, please refer to questions 7 & 8.

- With regards to severe visual impairment, how in depth is your coverage of this disability in comparison to Public Law 94-142?

| | | |
|-----------------------------------|--|---|
| <input type="checkbox"/> Detailed | <input type="checkbox"/> Somewhat detailed | <input type="checkbox"/> No coverage at all |
|-----------------------------------|--|---|

- Please mark each area of vision that you discuss in your classroom.

| |
|--|
| <input type="checkbox"/> Near-sightedness or Myopia |
| <input type="checkbox"/> Far-sightedness or Hyperopia |
| <input type="checkbox"/> Astigmatism |
| <input type="checkbox"/> Eye-Hand Coordination |
| <input type="checkbox"/> Eye Movements or tracking |
| <input type="checkbox"/> Focusing or Accommodation |
| <input type="checkbox"/> Eye teaming, coordination or binocularity |
| <input type="checkbox"/> Color Vision |
| <input type="checkbox"/> Visual Memory |
| <input type="checkbox"/> Vision Perception |
| <input type="checkbox"/> Other (Please Specify:_____) |

- What textbook(s) do you use in your course(s)?

Title(s):_____

Author(s)/Editor(s):_____

 Does it include sections on vision in the classroom environment?

| | |
|------------------------------|-----------------------------|
| <input type="checkbox"/> Yes | <input type="checkbox"/> No |
|------------------------------|-----------------------------|

- Do you invite guest lecturers to speak to your class(es) about the role of vision in learning?

| | | |
|---|---------------------------------------|---------------------------------|
| <input type="checkbox"/> Regularly (yearly) | <input type="checkbox"/> Occasionally | <input type="checkbox"/> Rarely |
|---|---------------------------------------|---------------------------------|

 If so, what was this person's profession?

| | |
|---|---|
| <input type="checkbox"/> Nurse | <input type="checkbox"/> Reading Specialist |
| <input type="checkbox"/> Ophthalmologist | <input type="checkbox"/> Physician |
| <input type="checkbox"/> Optometrist | <input type="checkbox"/> Other (Please Specify:_____) |
| <input type="checkbox"/> Don't know/ unsure | |

- Would you be interested in having a vision specialist lecture about vision and how it relates to learning in your class(es)?

| | | |
|------------------------------------|--------------------------------|-----------------------------|
| <input type="checkbox"/> Very much | <input type="checkbox"/> Maybe | <input type="checkbox"/> No |
|------------------------------------|--------------------------------|-----------------------------|

- Would you be interested in obtaining more information on the visual system and how it impacts the learning and reading process?

| |
|--|
| <input type="checkbox"/> No |
| <input type="checkbox"/> Yes, please address to: _____ |
| _____ |
| _____ |

THANK YOU FOR YOUR TIME AND CONSIDERATION!

APPENDIX III

STUDENT'S QUESTIONNAIRE

1. Please indicate which area(s) of education in which you intend to be involved.
Elementary Secondary
Special Education Reading Specialist
Other (Please Specify _____)

2. In your college education classes, were you familiarized with symptoms and behaviors which could indicate that a student had learning difficulties relate to vision?
Yes No

3. With regards to severe visual impairment, how in depth was your exposure to this disability in comparison to Public Law 94-142?
Extensive Moderate Not at all

4. Was vision, as it applies to learning in the classroom, addressed in your class?
Comprehensively Somewhat Not at all

5. Please mark each area of vision that was discussed in your classes, and then rate your comfort level, or familiarity with each term on the corresponding scale.

| | COMFORTABLE | | | NOT COMFORTABLE | |
|---|-------------|---|---|-----------------|---|
| <input type="checkbox"/> Near-sightedness or Myopia | 1 | 2 | 3 | 4 | 5 |
| <input type="checkbox"/> Far-sightedness or Hyperopia | 1 | 2 | 3 | 4 | 5 |
| <input type="checkbox"/> Astigmatism | 1 | 2 | 3 | 4 | 5 |
| <input type="checkbox"/> Eye-Hand Coordination | 1 | 2 | 3 | 4 | 5 |
| <input type="checkbox"/> Eye Movements or Tracking | 1 | 2 | 3 | 4 | 5 |
| <input type="checkbox"/> Focusing or Accommodative | 1 | 2 | 3 | 4 | 5 |
| <input type="checkbox"/> Eye teaming, coordination or binocularity | 1 | 2 | 3 | 4 | 5 |
| <input type="checkbox"/> Color Vision | 1 | 2 | 3 | 4 | 5 |
| <input type="checkbox"/> Visual Memory | 1 | 2 | 3 | 4 | 5 |
| <input type="checkbox"/> Vision Perception | 1 | 2 | 3 | 4 | 5 |
| <input type="checkbox"/> Other topics covered (Please Specify _____) | | | | | |

6. Did guest lecturers speak in any of your college education courses on the role of vision and learning?
More than once Once Never

What was this person's profession?

- Nurse Reading Specialist
Ophthalmologist Physician
Optometrist Other (Please Specify: _____)
Don't know/ unsure

7. Would you be interested in having a vision specialist speak to your college education classes about vision and how it relates to learning?
Very much Maybe No

8. Would you be interested in more information on the visual system and how it impacts the learning and reading process?

- No
Yes, please address to: _____

THANK YOU FOR YOUR TIME AND CONSIDERATION!

APPENDIX IV

30 August 1996

Dear Educators:

Let me begin by expressing my deepest gratitude for your support of this project. I am quite pleased to see that educators such as yourselves find value in the expansion of our knowledge base when it comes to teaching our country's future.

Being a native Kansan and an alumnus of a Kansas university, I intend to return to Topeka after completing my Masters of Education in May of 1997. My professional objective is to enhance the levels of understanding and cooperation between the professions of education and optometry in order to better serve the children in our schools.

I am a recent graduate from Pacific University College of Optometry, and am currently pursuing my Masters of Education, also here at Pacific. As part of my MEd thesis, I am conducting a survey of all the schools and colleges of education in the state of Kansas in order to determine how vision, as it is related to the learning process, is covered, to what extent, and in what manner. The intent of this study is not to praise those universities that address vision in an adequate fashion while pointing the long finger at those that do not address it at all, but rather it is meant to fill the void in the database that has been created by previous studies.

I understand that each and every one of you are under a very tight schedule in your courses, but I would forever be in your debt if you and your students could take the time to fill out the enclosed survey.

Again, thank you very much for your time, consideration, and effort. If you have any further questions, please don't hesitate to contact me at (800) 635-0561 ext. 2823 or FAX me at (503) 359-2929.

Sincerely,

William F. Hefner, O.D.

APPENDIX V

30 August 1996

Dear Education Students:

Let me begin by expressing my deepest gratitude for your participation in this project. I am quite pleased to see that future educators such as yourselves find value in the expansion of our knowledge base when it comes to teaching our country's children.

Being a native Kansan and an alumnus of a Kansas university, I intend to return to Topeka after completing my Master of Education in May of 1997. My professional objective is to enhance the levels of understanding and cooperation between the professions of education and optometry in order to better serve the children in our schools.

I am a recent graduate from Pacific University College of Optometry, and am currently pursuing my Master of Education, also here at Pacific. As part of my M.Ed thesis, I am conducting a survey of all the schools and colleges of education in the state of Kansas in order to determine how vision, as it is related to the learning process, is covered, to what extent, and in what manner. The intent of this study is not to praise those universities that address vision in an adequate fashion while pointing the long finger at those that do not address it at all, but rather it is meant to fill the void in the database that has been created by previous studies

I understand that each and every one of you are under a very heavy load in your courses, but I would forever be in your debt if you could take the time to fill out the enclosed survey. When completed, simply return to your teacher or to the office of the dean/education department chairperson.

Again, thank you very much for your time, consideration, and effort. If you have any further questions, please don't hesitate to contact me at (800) 635-0561 ext. 2823 or FAX me at (503) 359-2929.

Sincerely,

William F. Hefner, O.D.

APPENDIX VI

20 February 1997

Dear ...

Thank you ever-so-much for taking the time to fill out the survey regarding vision and learning last fall. To date, your response has helped me to develop a better understanding of how vision, as it relates to the learning process, is/was handled in your curriculum.

Enclosed, you will find a sheet of several of the more common visual disorders, a description of each, general classroom observations, accommodations you can make in order to better accommodate these children, and three sources for further information.

It's important to note that although I listed some things that can be done in a classroom setting to help these children, it is imperative that you not feel isolated in handling the suspected visual difficulty. Anytime you feel a child's vision may be hindering their classroom performance, don't hesitate to call upon a functional vision specialist such as a behavioral optometrist or an ophthalmologist with specific training in binocular vision. These individuals, like myself, have received additional training in the identification and remediation of learning related vision problems.

Remember, just like learning the letters of the alphabet, vision too is a learned process. If a child has not learned the most efficient way to use their vision, they may be floundering in any endeavors that require precise binocular vision. You and your colleagues are the children's greatest advocates, and the first line of defense when detecting learning problems. Hopefully the outline and additional sources I've provided will be helpful in your struggle to identify those children with learning related vision problems.

If you should ever have any questions, please don't hesitate to contact me via e-mail, phone, or fax at the source on my enclosed business card, or a vision specialist in your area.

Sincerely,

William F. Hefner, O.D.

APPENDIX VII

Myopia (Near-sightedness): Image of a distant object falls at a point in front of the retina, and no amount of focusing can make the blurred object clear.

OBSERVATIONS:

- Has trouble seeing chalkboard.
- Squints.
- Holds book too closely.
- Moves closer to see distant objects.

CLASSROOM ACCOMMODATIONS:

- Move child closer to front of class.
- Minimize number of tasks requiring distance vision.

Hyperopia (Far-sightedness): Light from an object falls behind the retina when focusing is relaxed. The act of focusing will cause blurred image to become clear.

OBSERVATIONS:

- Complains of blurry vision at near.
- Reports headaches after near work.
- Avoids near tasks.
- Has red, irritated eyes.
- Rubs eyes during short periods of visual activity.
- Shows poor comprehension.

CLASSROOM ACCOMMODATIONS:

- Minimize chalkboard to desk copying.
- Encourage eye contact with teacher.
- Reduce time on written tasks.
- Shorten work period, especially on near tasks.
- Avoid especially small, blurred, and faintly printed materials.

Astigmatism: Light rays from distance fail to meet at single point on the retina, but are spread out as a line in one direction or another.

OBSERVATIONS:

- Headaches.
- Discomfort in tasks that require visual interpretation.
- Difficulty seeing clearly at far and near.
- Red, irritated eyes.
- Spatial distortion in size, shape or inclination of objects.
- Blinks excessively at desk tasks.

CLASSROOM ACCOMMODATIONS:

- Move child closer to front of classroom.
- Reduce amount and time with near tasks.

Oculomotor Skills (Eye Tracking): includes two types of eye movements: Saccades or quick, jumping movements such as those used when reading, and Pursuits, which are used when following a slow moving object, such as a rolling ball.

OBSERVATIONS:

- Omits words when reading or copying.
- Skips lines when reading.
- Uses finger or marker to maintain place.
- Lacks comprehension when reading.
- Rereads lines unknowingly.

CLASSROOM ACCOMMODATIONS:

- Allow child to use finger or marker when
- Encourage eye contact with teacher.
- Minimize chalkboard to desk copying.
- Indicate the target the child should attend to by pointing at it.
- Avoid use of materials with small print.

Accommodation (Eye Focusing): Ability to make objects clear at any distance. The change in focus for objects at different distances is achieved through contraction or relaxation of the ciliary muscle in the eye, which in turn changes the curvature of the lens inside the eye.

OBSERVATIONS:

- Discomfort with near tasks.
- Report of blurry vision at distance after near work.
- Eyes occasionally tear.
- Holds book too closely.
- Excessively fatigued at end of day.

CLASSROOM ACCOMMODATIONS:

- Minimize chalkboard to desk copying.
- Shorten visual work periods.
- Allow frequent breaks during reading.

Binocularity (Eye Teaming): The ability to use the two eyes simultaneously to focus on the same object and to fuse the two images into a single image which gives correct interpretation of its solidity and its position in space. The ability to perceive depth or stereopsis.

OBSERVATIONS:

- Discomfort at far or near viewing.
- Intermittently reports double vision.
- Squints.
- Closes or covers one eye during visual tasks.
- Reports confusion of what is seen.
- Shows abnormal head turning or tilting.
- Consistently shows gross postural deviation at desk activities.
- Reports that letters, words, or both appear to float or move around.
- Reports sensation that eyes are "not working together."
- Lacks depth perception.

CLASSROOM ACCOMMODATIONS:

- Allow child to use finger or marker when reading.
- Minimize chalkboard to paper copying.
- Shorten visual work periods, especially on near tasks.

Form Perception and Discrimination: Ability to discriminate dominant features of objects and letterlike forms.

OBSERVATIONS:

- Tends to over generalize in placing objects into classes.
- Confuses likeness and differences.
- Mistakes words with similar beginnings.
- Fails to recognize same word in next sentence.
- Tends to use other senses to make what should be visual discriminations.
- May have difficulty recognizing alphabet or even simple forms.

CLASSROOM ACCOMMODATIONS:

- Allow tracing of forms with finger prior to copying or discriminating.
- Maximize teacher input during independent work periods.
- Remove distracting materials unrelated to task.
- Use tracing and matching activities.

Visual Memory: Ability to recall dominant features of a stimulus item or to remember the sequence of several items.

OBSERVATIONS:

- Difficulty organizing materials.
- Poor spelling skills.
- Ignores left to right direction.
- Difficulty visualizing what is read.
- Difficulty with tasks requiring more than one step.
- Whispers to self during reading.
- Difficulty with math concepts.
- Difficulty with "look and Say" method of learning to read.
- Poor recall of visually presented materials.
- Often comments that words look familiar but cannot recall it.

CLASSROOM ACCOMMODATIONS:

- Allow use of memory aids, i.e. mnemonics.
- Reinforce visually presented material with other sensory input.
- Reduce number of steps in visual tasks.
- Give child organized method of attacking tasks.

Suggested Resources:

- Rouse MW, Ryan JB: Teacher's Guide to Vision Problems. *The Reading Teacher* 38:306-318, 1984.
- American Optometric Association. 243 N. Lindbergh Blvd., St. Louis, MO. 63141.
- College of Optometrists in Vision Development. P.O. Box 285, Chula Vista, CA 91912-0285.